RM80 FCTNL TEST PT 2 CZRNEAO AH-T113A-MC FICHE 1 OF 2

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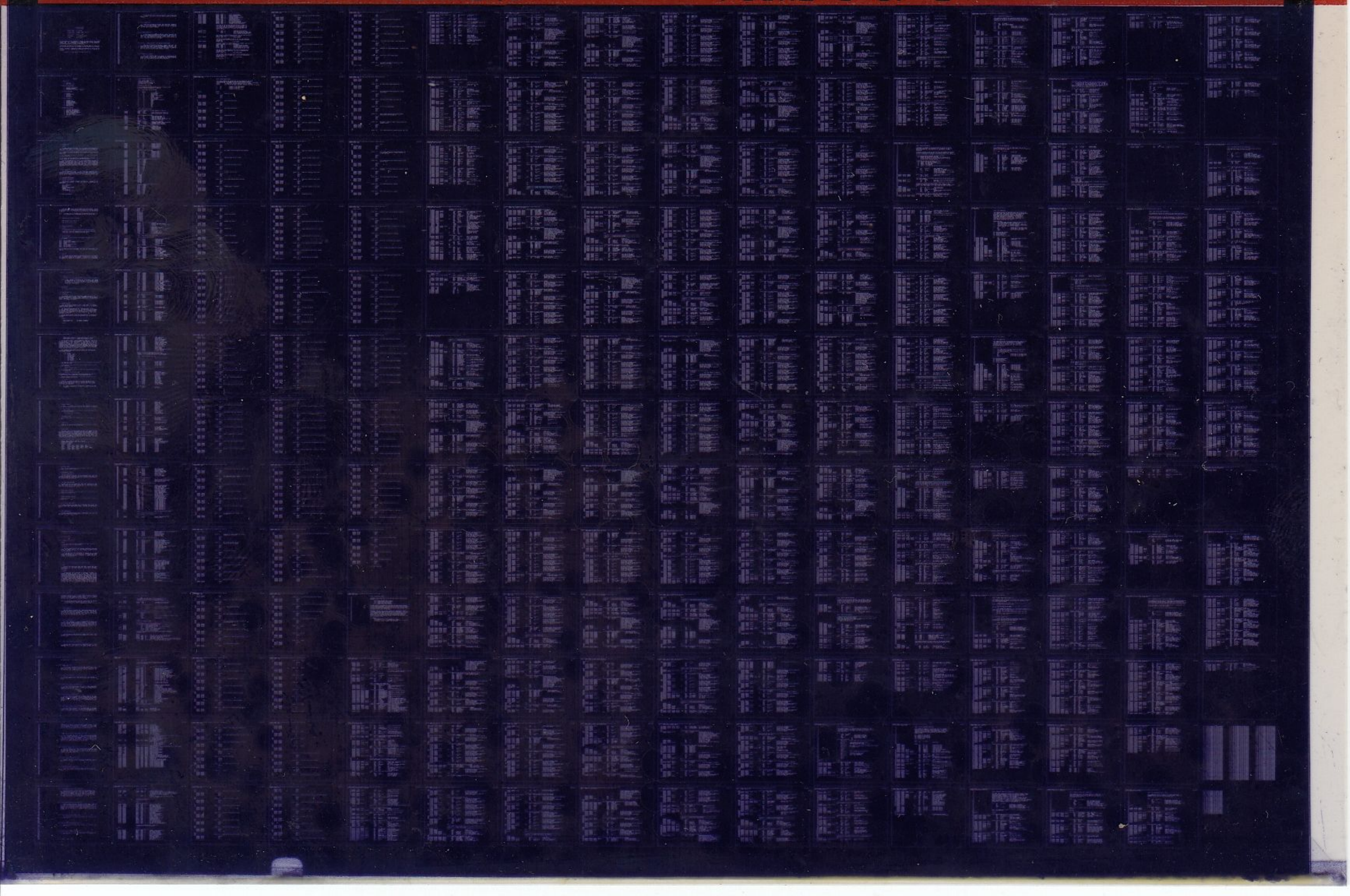

RM80

FCTNL TEST PT 2
CZRNEA0

AH-T113A-MC
FICHE 2 OF 2

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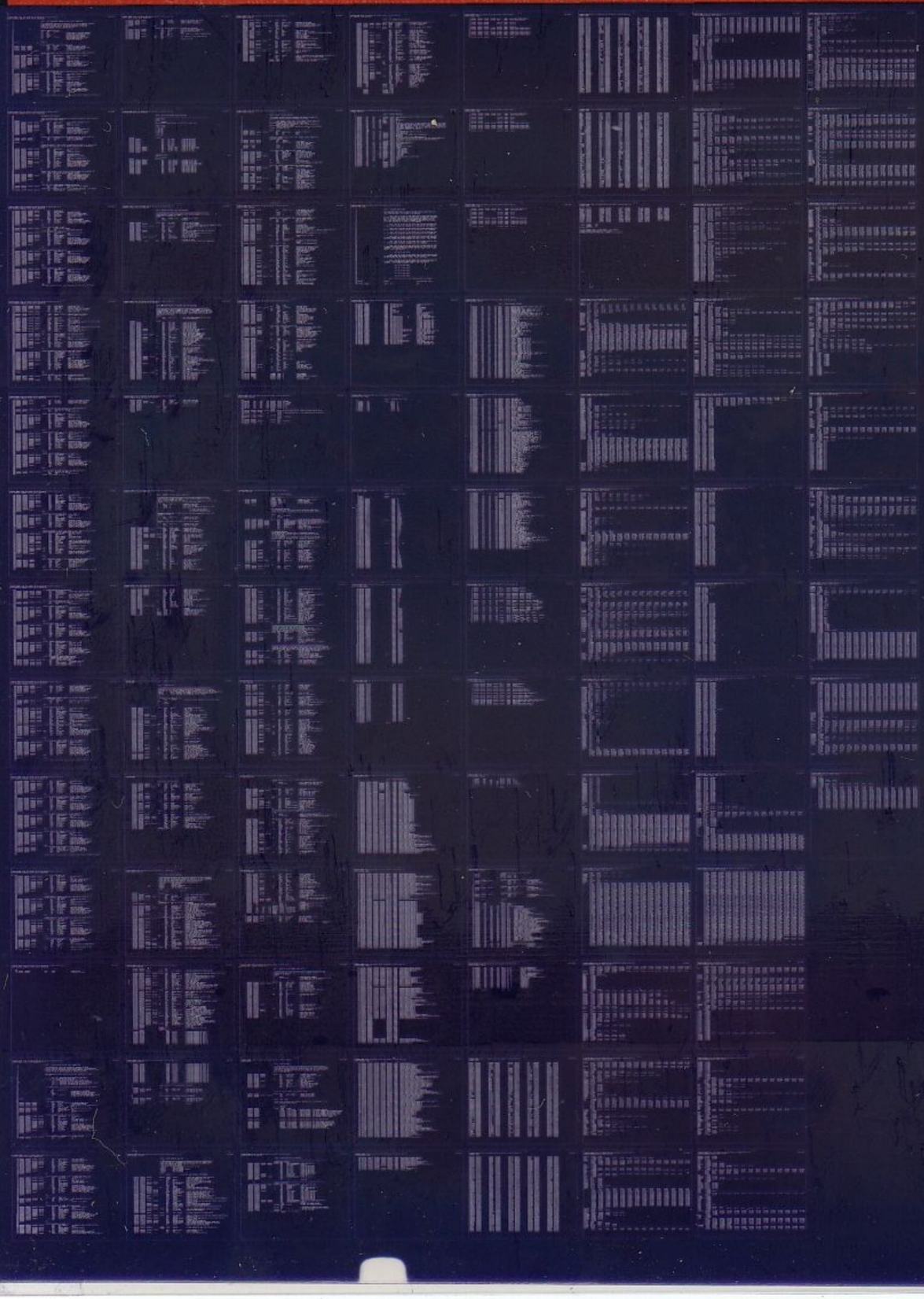

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IDENTIFICATION

PRODUCT CODE: AC-T112A-MC

PRODUCT NAME: CZRNEA0 RM80 FCTNL PT2

PRODUCT DATE: APRIL 1, 1982

MAINTAINER: CX DIAGNOSTIC GROUP

AUTHOR: MIKE LEAVITT

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1.0 INTRODUCTION

1.1 ABSTRACT

THE RM80 SUBSYSTEM FUNCTIONAL TEST IS A STAND ALONE PROGRAM WHICH USES FUNCTIONAL MEANS TO VERIFY THE OPERABILITY OF THE RM80 DISK SUBSYSTEM. IN PARTICULAR, THE PROGRAM SERVES THE FOLLOWING PURPOSES:

TO EXPLICITLY ESTABLISH CONFIDENCE IN THE BASIC OPERATIONS OF THE DISK DRIVE, INCLUDING MECHANICAL POSITIONING AND DATA TRANSFER OPERATIONS;

TO IMPLICITLY ESTABLISH CONFIDENCE IN THE DRIVE/ADAPTER ELECTRICAL INTERFACE;

TO VERIFY THE FUNCTIONALITY OF THE RM80 SUBSYSTEM, INCLUDING THE MASSBUS CONTROLLER, MASSBUS ADAPTER AND THE DISK DRIVE.

THE TEST IS COMPRISED OF 4 PARTS, WHICH WOULD NORMALLY BE RUN IN SEQUENCE, STARTING WITH PART 1. BRIEFLY, PART 1 TESTS HOUSEKEEPING AND MECHANICAL POSITIONING OPERATIONS; PART 2 TESTS WRITE, READ AND WRITE CHECK OPERATIONS USING HEADER AND DATA; PART 3 TESTS WRITE, READ AND WRITE CHECK OPERATIONS USING DATA; PART 4 TESTS MECHANICAL POSITIONING OPERATIONS AND VARIOUS TIMING PARAMETERS OF THE RM80 DISK DRIVE.

1.2 UNIT UNDER TEST

THE UNIT UNDER TEST (UUT) IS THE RM80 DISK SUBSYSTEM WHICH CONSISTS OF THE RH70 MASSBUS CONTROLLER ,THE RM80 MASSBUS ADAPTER , AND THE STORAGE MODULE DISK DRIVE. NOTE THAT A DISK IS REQUIRED FOR TESTING AND IS CONSIDERED AN INTEGRAL OF THE STORAGE MODULE DISK DRIVE.

2.0 OPERATING REQUIREMENTS

2.1 HARDWARE REQUIREMENTS

THE FOLLOWING MINIMUM HARDWARE CONFIGURATION, ASSUMED TO BE OPERATIONAL, IS REQUIRED TO LOAD AND EXECUTE THE RM80 SUBSYSTEM FUNCTIONAL TEST:

PDP-11 PROCESSOR
20K MEMORY
KW11-L OR KW11-P CLOCK
PROGRAM LOADING DEVICE
TERMINAL
RH70 CONTROLLER
1 TO 8 RM80 DISK DRIVES

2.2 MEDIA REQUIREMENTS

EACH UNIT BEING TESTED MUST BE LOADED WITH A DISK BEFORE TESTING BEGINS ON THAT UNIT. THE DRIVE MUST HAVE A FORMATTED DISK AND CONTAIN A READABLE COPY OF THE MFG(DEC144), USR(DEC144) AND SSF BAD SECTOR FILES.

NOTE: TO ENSURE THAT ALL CUSTOMER DATA IS PRESERVED ON THE DISK, ALL DATA TRANSFERS WILL BE PERFORMED ON THE FE CYLINDERS ONLY.

2.3 PREREQUISITE DIAGNOSTIC PROGRAMS

RM80 DISKLESS TEST, PART 1 & 2

RM80 FUNCTIONAL TEST, PART 1

3.0 OPERATING PROCEDURE

3.1 LOADING

THE PROGRAM MAY BE LOADED BY EITHER OF THE FOLLOWING MEDIA:

.PAPER TAPE, USING THE STANDARD PAPER TAPE LOADING PROCEDURE.
.XXDP MEDIA, USING THE APPROPRIATE LOADING DEVICE.

3.2 SWITCH OP[illegible]

THE FOLLOWING SWITCH OPTIONS ARE PROVIDED TO ENHANCE THE UTILITY OF THE PROGRAM.

SW15 HALT ON ERROR
SW14 LOOP ON TEST (CURRENTLY BEING EXECUTED)
SW13 INHIBIT ERROR TYPEOUTS
SW12 UNUSED
SW11 INHIBIT TEST ITERATIONS
SW10 BELL ON ERROR
SW09 LOOP ON ERROR
SW08 LOOP ON TEST IN SW07-00

THE LOW ORDER 8 SWITCHES (SW07-SW00), ARE USED IN CONJUNCTION WITH SW08 TO SPECIFY THE OCTAL NUMBER OF THE TEST WHICH THE PROGRAM WILL LOOP ON.

3.3 STARTING

THE PROGRAM MAY BE STARTED AT LOCATION 200 OR 204. STARTING AT 200 WILL BE THE NORMAL STARTING ADDRESS. STARTING AT 204 WILL ENABLE THE RH/RM BASE ADDRESS TO BE CHANGED. IF RUNNING IN A STAND-ALONE ENVIRONMENT, THE PROGRAM USES CONSOLE DIALOGUE TO ALLOW THE OPERATOR

TO CONTROL TEST CONDITIONS.

3.4 HALTING

THE PROGRAM SHOULD BE HALTED BY TYPING CONTROL C FROM THE CONSOLE.

NOTE: IF THE PROGRAM IS HALTED BY ANY OTHER MEANS, BAD HEADER INFORMATION MAY BE LEFT ON THE DISK. THIS OF COURSE, DEPENDS ON WHICH TEST WAS BEING PERFORMED AT THE TIME THE PROGRAM WAS HALTED. ALSO, THIS ONLY APPLIES TO A NORMAL (ERROR FREE) OPERATION OF THE PROGRAM.

3.5 RESTARTING

THE PROGRAM CAN BE RESTARTED AT ADDRESS 200 OR 204. (SEE SECTION 3.3)

4.0 OPERATOR INTERFACE

4.1 PROGRAM ID

THE PROGRAM TYPES ITS TITLE AND MAINDEC NUMBER THE FIRST TIME IT IS STARTED AFTER BEING LOADED. ALSO, A WARNING MESSAGE IS TYPED, NOTIFING THE OPERATOR OF POSSIBLE HEADER CORRUPTION IF THE PROGRAM IS HALTED IMPROPERLY. THE PROGRAM IDENTIFICATION AND THE WARNING DO NOT OCCUR IF THE PROGRAM IS RESTARTED.

4.2 CONSOLE DIALOGUE

WHEN THE PROGRAM IS RUNNING IN STAND ALONE MODE, IT ENTERS A CONSOLE DIALOGUE SEQNENCE AFTER TYPING THE PROGRAM I.D. AND WARNING MESSAGE.(SEE SECTION 4.1)

THE FIRST QUESTION TYPED OUT IS: "TYPE HELP TEXT (L) N ?". IF THE OPERATOR RESPONDS WITH A "Y", THE PROGRAM WILL TYPE A BRIEF HELP MESSAGE WHICH WILL LIST SWITCH OPTIONS, ETC. ANY OTHER RESPONSE TO THE QUESTION IS CONSIDERED A "N" AND NO HELP TEXT IS TYPED. THIS QUESTION IS ONLY ASKED ON THE INITIAL PROGRAM START AND NOT ON SUBSEQUENT START-UP'S.

ON THE PROGRAM INITIAL START AND WHEN RESTARTING AT LOCATION 204, THE OPERATOR MAY CHANGE THE RH/RM BASE ADDRESSES WITH THE FOLLOWING DIALOGUE.

EXAMPLE 1

```
RMCS1=176700 <CR>       ;NO CHANGE IN ADDRESS
RMVEC=000254 <CR>       ;NO CHANGE IN ADDRESS
```

EXAMPLE 2

```
                RMCS1=176700 177200<CR> ;CHANGE BASE ADDRESS TO 177200
                RMVEC=000254 260<CR>    ;CHANGE VECTOR ADDRESS TO 260

     ON THE INITIAL START,  THE NEXT QUESTION  TYPED IS, 'TYPE "A" TO
TEST ALL DRIVES,  OR TYPE  DRIVE NUMBER(S)  AND TERMINATE  INPUT WITH
A CARRIAGE RETURN'.  THEN, 'DRIVE(S):'  IS TYPED  AND  WAITS  FOR THE
OPERATOR TO  TYPE AN "A",  TO TEST  ALL POSSIBLE DRIVES  OR TYPE  ANY
STRING OF DRIVE NUMBER(S) TO BE TESTED AND TERMINATE THE INPUT WITH A
"CARRIAGE RETURN".  NO COMMAS OR ANY OTHER SEPARATORS ARE NEEDED WHEN
ENTERING THE  DRIVE NUMBERS AS A STRING. THE PROGRAM ENTERS THE COMMA
SEPARTOR AUTOMATICALLY  AFTER TYPING  EACH NUMBER.  ON ALL SUBSEQUENT
STARTS, ONLY THE 'DRIVE(S):' PROMPT IS TYPED.

     THE DIAGNOSTIC THEN INITIALIZES AND REPORTS THE STATUS OF THE
DRIVES WHICH WHERE PREVIOUSLY SPECIFIED FOR TESTING. THE FOLLOWING
IS AN EXAMPLE PRINTOUT:

          'UNIT STATUS:
            0    ONLINE   RM80
            1    LOAD DEVICE
            2    OFFLINE  RM80
            3    NOT PRESENT
            4    NOT PRESENT
            5    NOT AN RM80
            6    NOT PRESENT
            7    NOT PRESENT'

     THE ABOVE UNIT STATUS SHOWS THAT DRIVE 0 WILL BE TESTED, WHILE DRIVES
1 - 7 WILL NOT BE TESTED.

     THE DIAGNOSTIC THEN TYPES THE FOLLOWING MESSAGE, BASED ON THE
STATUS OF THE DRIVE:

          'DRIVE(S) TO BE TESTED, 0'

     IF NO DRIVES ARE AVAILABLE FOR TESTING, THE FOLLOWING MESSAGE WILL BE
TYPED TO THE OPERATOR:

          'DRIVE(S) TO BE TESTED, NONE'

THE PROGRAM WILL THEN, EITHER START TESTING THE DRIVES AVAILABLE FOR
TESTING OR RETURN TO THE BEGINNING OF THE PROGRAM AND WAIT.

     ONCE THE DRIVES START TESTING, THE FOLLOWING MESSAGE WILL OCCUR
AS EACH DRIVE BEGINS TO BE TESTED:

          'DRIVE 0'

     AFTER ALL THE DRIVES ARE COMPLETELY TESTED, THE END OF PASS
MESSAGE WILL BE TYPED (SEE SECTION 4.3) AND THE PROGRAM WILL START
TESTING ALL THE DRIVES AGAIN. THIS WILL CONTINUE UNTIL THE PROGRAM
IS HALTED BY THE OPERATOR.

NOTE:   THE LETTER LOCATED WITHIN THE BRACKETS () INDICATES THE TYPE
        OF RESPONSE  REQUIRED  BY THE USER,  D=DECIMAL,  O=OCTAL AND
        L=LETTER.
```

4.3 PROGRESS REPORTS

AN END OF PASS REPORT OCCURS EACH TIME THE PROGRAM IS EXECUTED FOR ALL DEVICES IN THE TEST QUE. THE END OF PASS REPORT IS AS FOLLOWS.

'END OF PASS 1'

THE FOLLOWING MESSAGE WILL ALSO OCCUR IF THERE WERE ERRORS SINCE THE LAST END OF PASS REPORT

'TOTAL ERRORS SINCE LAST REPORT 0'

4.4 PERFORMANCE REPORT

NO PERFORMANCE REPORTS ARE GIVEN DURING THE EXECUTION OF THE PROGRAM.

4.5 PROGRAM HALTS

THERE ARE NO SCHEDULED HALTS DURING THE EXECUTION OF THE PROGRAM. PROCESSOR HALTS ARE DUE TO THE TRAP CATCHER.

4.6 ERROR REPORTS

THE FIRST LINE OF THE ERROR REPORT CONTAINS THE NUMBER OF THE UNIT (DRIVE) BEING TESTED, THE DRIVE TYPE, THE TEST NUMBER, THE ERROR NUMBER AND THE VALUE OF THE PROGRAM COUNTER WHERE THE ERROR WAS CALLED. THIS LINE IS FOLLOWED BY THE ERROR MESSAGE: ONE OR MORE LINES OF TEXT WHICH GIVE A BRIEF, YET COMPREHENSIVE DESCRIPTION OF THE ERROR. THE ERROR MESSAGE IS NORMALLY FOLLOWED BY ONE OR MORE PAIRS OF LINES CONTAINING DATA HEADERS AND DATA PERTININENT TO THE ERROR, INCLUDING EXPECTED AND ACTUAL TEST RESULTS.

THE FOLLOWING PRINTOUT SHOWS A TYPICAL ERROR MESSAGE FOR THIS PROGRAM:

```
DRV# 0 - RM80, TEST# 14, ERR# 326, PC=016654
MASSBUS DATA BUS PARITY ERROR 'MDPE' (RMCS2, BIT 8) DETECTED
DURING WRITE COMMAND
EXPECTD    RECEVD
040300     040700
RMCS1      RMCS2   RMDS    RMER1   RMER2   RMAS
144252     040700  010700  000000  000000  000000
RMWC       RMBA    RMDA    RMOF    RMDC    RMEC1   RMEC2
177403     104604  000002  010000  000000  004066  000000
RMMR1      RMMR2   RMDT    RMSN
000010     011777  024026  177777
```

4.7 EXECUTION TIME

PASS 1 OF THE PROGRAM TAKES ABOUT 20 SECONDS. PASS 2 AND SUBSEQUENT PASSES TAKE 55 SECONDS.

5.0 ENVIRONMENTAL SUPPORT

5.1 PROCESSOR COMPATIBILITY

THE RM80 SUBSYSTEM FUNCTIONAL TEST IS EXECUTABLE ON A PDP-11/70 PROCESSOR, PROVIDING PREVIOUSLY MENTIONED HARDWARE REQUIREMENTS ARE MET, AND PROVIDING THAT DATA THROUGHPUT ON THE SYSTEM IS SUFFICIENT TO SUSTAIN DATA TRANSFER OPERATIONS.

5.2 DUAL PORT CONFIGURATIONS

THE RM80 SUBSYSTEM FUNCTIONAL TEST DOES NOT SPECIFICALLY TEST DUAL PORT LOGIC IN THE RM30 ADAPTER BUT IS EXECUTABLE ON RM80 SUBSYSTEMS HAVING THE DUAL PORT OPTION PROVIDING THE DUAL PORT SWITCH IS SET TO THE APPROPRIATE PORT (A OR B).

5.3 MEMORY PARITY HARDWARE

MEMORY PARITY HARDWARE IS NOT USED DURING THE EXECUTION OF THE RM80 SUSBYSTEM FUNCTIONAL TEST.

5.4 MEMORY MANAGEMENT HARDWARE

MEMORY MANAGEMENT HARDWARE IS NOT USED DURING THE RM80 SUSBYSTEM FUNCTIONAL TEST.

5.5 ACT11, APT11 COMPATIBILITY

THE RM80 SUSBYSTEM FUNCTIONAL TEST IS COMPATIBLE WITH ACT11 AND APT11 IN BOTH DUMP AND AUTOMATIC MODES. FURTHER, THE PROGRAM WILL EXECUTE A QUICK PASS DURING THE FIRST PASS IN SUPPORT OF QUICK VERIFY MODE.

5.6 XXDP COMPATIBILITY

THE RM80 SUSBYSTEM FUNCTIONAL TEST IS COMPATIBLE WITH XXDP IN DUMP AND CHAIN MODES, AND PROVIDES MEDIA PROTECTION IN THE CASE WHERE THE RM80 IS THE XXDP LOADING DEVICE.

5.7 OPERATING SYSTEM COMPATIBILITY

THE PROGRAM IS NOT COMPATIBLE WITH ANY SOFTWARE OPERATING SYSTEM.

6.0 TEST DESCRIPTION

TEST 1 CONTROLLER ACCESS TEST

PURPOSE:

TO VERIFY THAT THE UNIBUS ADDRESS OF THE RM80 SUBSYSTEM IS CORRECT, AS DEFINED AT LOCATION $BASE.

PROCEDURE:

THE TEST TRIES TO ACCESS ALL MASSBUS CONTROLLER REGISTERS USING THE $BASE ADDRESS. REGISTER CONTENTS ARE IGNORED DURING THE TEST, AND THE TEST FAILS IF A BUS TIMEOUT OCCURS FOR ANY REGISTER TRANSFER.

IF THE TEST FAILS AND THE PROGRAM IS RUNNING IN A STAND ALONE ENVIRONMENT, I.E., LOCATION 42 IS 0, THE PROGRAM WILL JUMP TO LOCATION 204 WHICH ALLOWS THE OPERATOR TO CHANGE THE $BASE ADDRESS VIA CONSOLE DIALOGUE. OTHERWISE, THE PROGRAM ESCAPES TO THE END OF PASS HANDLER.

TEST 2 - 30 WRITE/READ HEADER AND DATA (FORMAT) TESTS

PURPOSE:

TO TEST WRITE HEADER AND DATA AND READ HEADER AND DATA FUNCTIONALITY OF THE RM80 SUBSYSTEM USING A SET OF VARIABLES WHICH INCLUDE WORD COUNT, HEAD MOTION, HEAD SWITCHING AND ERROR CONDITIONS.

PROCEDURE:

ALTHOUGH EACH TEST EXERCISES A DIFFERENT VARIABLE, THE GENERAL PROCEDURE OF EACH TEST IS THE SAME. THE DRIVE IS INITIALIZED AND RECALIBRATED IF "PIP" OR "SKI" ARE ACTIVE SO THAT THERE ARE NO ERRORS WHEN A TEST BEGINS. FOLLOWING THAT, THE TEST PERFORMS ANY EXPLICIT SEEKS REQUIRED FOR THE CONDITIONS OF THE TEST. REGISTERS ARE PRESET AND THE WRITE HEADER AND DATA COMMAND IS EXECUTED. WHEN THE WRITE COMMAND IS COMPLETE, THE TEST STORES ALL SUBSYSTEM STATUS AND CHECKS FOR PRIMARY ERRORS WHICH PRECLUDE OTHER STATUS CHECKS. IF THERE ARE NO PRIMARY ERRORS, THE TEST VERIFIES THE RESULTS OF THE WRITE COMMAND AND THEN CHECKS FOR SECONDARY ERRORS. LOOP ADDRESSES ARE MODIFIED FOLLOWING THE

SUCCESSFUL COMPLETION OF THE WRITE COMMAND IN ORDER TO SHORTEN EXECUTION TIMES AND ENHANCE SCOPING LOOPS, THEN THE PROGRAM EXECUTES THE READ HEADER AND DATA PORTION OF THE TEST, VERIFYING THE SAME TYPE OF ERRORS AS IN THE WRITE COMMAND.

NOTE: THE SECTOR USED DURING A TEST MAY DIFFER FROM THE PROGRAM LISTING BECAUSE THE PROGRAM SUBSTITUTES A GOOD SECTOR, IF THE ONE SELECTED IS LISTED IN THE BAD BLOCK TABLE.

TEST 2 FORMAT ZEROS TEST

THE TEST SEEKS TO CYLINDER 559., THEN WRITES HEADER AND DATA ON SECTOR 1 IN 18 BIT FORMAT. THE HEADER AND DATA FIELDS ARE ALL ZEROS, CAUSING THE DEVICE TO USE NORMAL WRITE GATE. THE HEADER AND DATA ARE READ AND COMPARED WITH THE WRITE BUFFER. THE INITIAL SEEK POSITIONS THE HEAD SUCH THAT THERE IS NO IMPLIED SEEK. THE TEST IS REPEATED FOR 16 BIT FORMAT.

TEST 3 ZERO FILL TEST TEST

THE TEST EXECUTES A SEEK TO CYLINDER 559. TO INSURE THAT THERE IS NO HEAD MOTION DURING DATA TRANSFER. THIS IS FOLLOWED BY A WRITE HEADER AND DATA COMMAND WITH THE WORD COUNT EQUAL TO THE SIZE OF THE HEADER WHICH CAUSES THE RH70 TO ZERO FILL THE DATA FIELD. THE READ HEADER AND DATA COMMAND THAT FOLLOWS READS A FULL SECTOR AND VERIFIES THAT DATA WAS ZERO FILLED.

TEST 4 FORMAT CHECK ZEROS TEST

THE TEST WRITES HEADER AND AN ALL ZEROS DATA FIELD, THEN PERFORMS A WRITE CHECK HEADER AND DATA COMMAND AND VERIFIES THERE ARE NO ERRORS.

TEST 5 FORMAT CHECK ZEROS W/ WCE ERROR TEST

THE TEST WRITES HEADER AND AN ALL ZEROS DATA FIELD. AFTER COMPLEMENTING THE LAST WORD OF THE WRITE BUFFER, THE TEST PERFORMS A WRITE CHECK HEADER AND DATA COMMAND AND VERIFIES THAT

THE CORRECT WRITE CHECK ERROR IS DETECTED.

TEST 6 FORMAT ONES TEST

THE TEST WRITES HEADER AND AN ALL ONES DATA FIELD, THEN READS THE HEADER AND DATA, VERIFYING THE READ BUFFER WITH THE WRITE BUFFER. THE ALL ONES FIELD IS A CONSTANT FREQUENCY, AND THE DRIVE SHOULD USE NORMAL WRITE GATE.

TEST 7 FORMAT CHECK ONES TEST

THE TEST FORMATS AN ALL ONES DATA FIELD, THE PERFORMS A WRITE CHECK HEADER AND DATA COMMAND, VERIFYING THAT THERE ARE NO ERRORS.

TEST 10 FORMAT CHECK ONES W/ WCE ERROR TEST

THE TEST FORMATS AN ALL ONES DATA FIELD. THEN COMPLEMENTS THE LAST WORD OF THE WRITE BUFFER. A WRITE CHECK HEADER AND DATA COMMAND IS EXECUTED, AND THE TEST VERIFIES THAT THE CORRECT WRITE CHECK ERROR IS DETECTED.

TEST 11 FORMAT MULTIPLE SECTORS TEST

THE TEST SEEKS TO CYLINDER 559. TO INSURE THERE IS NO HEAD MOTION DURING DATA TRANSFER. THE WRITE HEADER AND DATA COMMAND FOLLOWS, WITH THE WORD COUNT EQUAL TO MULTIPLE SECTORS. THE SAME SECTORS ARE VERIFIED WITH A WRITE CHECK HEADER AND DATA COMMAND. THE TEST IS REPEATED FOR 16 BIT FORMAT WITH THE SSEI BIT SET.

TEST 12 READ HEADER & DATA W/ HEAD SWITCHING TEST

THE TEST SEEKS TO CYLINDER 559. TO INSURE THERE IS NO HEAD MOTION DURING DATA TRANSFER. THE READ HEADER AND DATA COMMAND STARTS WITH CYLINDER 559., TRACK 2, SECTOR 30. THE WORD COUNT IS EQUAL TO MULTIPLE SECTORS WHICH CAUSES THE SUBSYSTEM TO SWITCH

FROM TRACK 2 TO TRACK 3 AFTER THE FIRST SECTOR IS READ. IF THE 'SSE' BIT IS SET AFTER EXECUTING A DATA COMMAND, THE 16 BIT MODE WILL BE TERMINATED AND THE TEST IS REPEATED FOR 16 BIT FORMAT WITH THE SSEI BIT SET, WHERE SECTOR 31. IS THE LAST SECTOR. IF NO 'SSE' WAS SET, THEN BOTH FORMAT MODES WILL BE EXECUTED.

TEST 13 READ HEADER & DATA W/ MID-TRANSFER SEEK TEST

THIS TEST READS MULTIPLE SECTORS STARTING WITH CYLINDER 559., LAST TRACK AND SECTOR 30., CAUSING A MID-TRANSFER SEEK AFTER THE FIRST OF THE MULTIPLE SECTORS IS READ. IF THE 'SSE' BIT IS SET AFTER EXECUTING A DATA COMMAND, THE 16 BIT MODE WILL BE TERMINATED AND THE TEST IS REPEATED FOR 16 BIT FORMAT WITH THE SSEI BIT SET, WHERE SECTOR 31. IS THE LAST SECTOR. IF NO 'SSE' WAS SET, THEN BOTH FORMAT MODES WILL BE EXECUTED.

TEST 14 FORMAT W/ IMPLIED SEEK TEST

THIS TEST SEEKS TO THE FIRST CYLINDER PRIOR TO WRITING HEADER AND DATA ON CYLINDER 559. THE EXPLICIT SEEK INSURES THAT THERE WILL BE MAXIMUM HEAD MOTION DURING THE IMPLIED SEEK OF THE WRITE COMMAND. THE SAME OPERATION, INCLUDING THE EXPLICIT SEEK IS REPEATED FOR READ HEADER AND DATA.

TEST 15 FORMAT EACH SECTOR ADDRESS TEST

HEADERS AND DATA OF EACH SECTOR ON CYLINDER 559., TRACK 2 ARE FORMATTED AND READ WITH THE PROGRAM VERIFYING HEADERS AND DATA.

TEST 16 FORMAT EACH TRACK ADDRESS TEST

THIS TEST FORMATS SECTOR 0 OF EACH TRACK ON CYLINDER 560. AND READS EACH SECTOR WITH THE PROGRAM VERIFYING HEADERS AND DATA.

```
                        TEST 17 READ HEADER & DATA IN LAST SECTOR TEST

                             THIS TEST EXECUTES A READS HEADER AND DATA COMMAND ON THE
                        LAST SECTOR (30.)  OF  THE DISK,  IN 16 BIT  FORMAT  MODE  AND
                        VERIFIES THAT LBT STATUS SETS.  IF THE 'SSE' BIT  IS SET AFTER
                        EXECUTING A DATA COMMAND,  THE 16 BIT  MODE WILL BE TERMINATED
                        AND  THE TEST  IS REPEATED FOR 16 BIT FORMAT WITH THE SSEI BIT
                        SET, WHERE SECTOR 31. IS THE LAST SECTOR. IF NO 'SSE' WAS SET,
                        THEN BOTH FORMAT MODES WILL BE EXECUTED.



                        TEST 20 READ HEADER & DATA W/ AOE ERROR TEST

                             THIS TEST READS MULTIPLE  SECTORS IN 16 BIT FORMAT, STARTING
                        WITH  THE  LAST SECTOR 30. AND  VERIFIES THAT AOE STATUS SETS. IF
                        THE 'SSE' BIT IS  SET AFTER  EXECUTING A DATA COMMAND. THE 16 BIT
                        MODE WILL  BE TERMINATED  AND THE  TEST IS  REPEATED FOR  16  BIT
                        FORMAT  WITH THE  SSEI BIT  SET,  WHERE SECTOR  31. IS  THE  LAST
                        SECTOR.  IF NO  'SSE' WAS SET,  THEN BOTH  FORMAT  MODES WILL  BE
                        EXECUTED.



                        TEST 21 READ INVALID SECTOR ADDRESS TEST

                             THIS TEST USES AN ILLEGAL SECTOR ADDRESS AND  VERIFIES  THAT
                        IAE STATUS SETS.



                        TEST 22 READ INVALID TRACK ADDRESS TEST

                             THIS TEST USES AN ILLEGAL TRACK ADDRESS  AND  VERIFIES  THAT
                        IAE STATUS SETS.



                        TEST 23 READ INVALID CYLINDER ADDRESS TEST

                             THIS TEST USES AN ILLEGAL CYLINDER ADDRESS AND VERIFIES THAT
                        IAE STATUS SETS.



                        TEST 24 FORMAT AT OFFSET TEST
```

THE PROGRAM SETS OFFSET MODE AND EXECUTES A WRITE HEADER AND DATA COMMAND, VERIFYING THAT OFFSET MODE IS RESET BY THE WRITE COMMAND.

TEST 25 IVC FORMAT TEST

VOLUME VALID IS RESET BY SETTING AND RESETTING DIAGNOSTIC MODE. THE TEST THEN EXECUTES A WRITE HEADER AND DATA COMMAND AND VERIFIES THAT INVALID COMMAND STATUS SETS. THE TEST IS REPEATED FOR READ HEADER AND DATA COMMAND.

TEST 26 FORMAT ERROR TEST

A SINGLE SECTOR IS FORMATTED WITH THE OFFSET REGISTER SET FOR 16 BIT FORMAT AFTER WHICH THE SAME SECTOR IS READ IN 18 BIT FORMAT WITH THE PROGRAM VERIFYING THAT FORMAT ERROR STATUS IS SET. THE SAME PROCEDURE IS REPEATED WITH THE SECTOR WRITTEN IN 18 BIT FORMAT AND READ IN 16 BIT FORMAT.

TEST 27 & 30 FORMAT HCE TEST (1ST AND 2ND HEADER WORDS)

THESE TWO TESTS WRITE AN INCORRECT HEADER THEN READ THE HEADER AND VERIFY THAT THE CORRECT HEADER ERROR IS DETECTED. THE TESTS SETUP THE CORRECT HEADER, THEN COMPLEMENT BIT 0 AND USE THE MODIFIED BUFFER TO WRITE THE HEADER. THE PROCESS IS REPEATED UNTIL EACH BIT POSITION HAS BEEN SEPARATELY TESTED.

TEST 31 FORMAT FE CYLINDERS

THIS TEST FORMATS BOTH FE CYLINDERS TO RE-ESTABLISH THE CORRECT FORMAT ON THE SECTORS THAT WERE WRITTEN UPON BY PREVIOUS TESTS. THE TEST IS DONE IN 16 BIT FORMAT WITH THE SSEI BIT SET TO ALLOW ALL 32 SECTORS ON EACH TRACK TO BE FORMATTED.

\

```
                        ;*LAST REVISION 19-OCT-81
                        .TITLE  CZRNEA0 RM80 FCTNL PT2
                        ;*COPYRIGHT (C) 1982
                        ;*DIGITAL EQUIPMENT CORPORATION
                        ;*COLORADO SPGS., CO. 80919
                        ;*
                        ;*PROGRAM BY MIKE LEAVITT
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C5), 18-MAR-81
                        ;*
                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH                  USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        14            LOOP ON TEST
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        12            UNUSED
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            LOOP ON TEST IN SWR<7:0>
                        ;*         7            TN128
                        ;*         6            TN64
                        ;*         5            TN32
                        ;*         4            TN16
                        ;*         3            TN8
                        ;*         2            TN4
                        ;*         1            TN2
                        ;*         0            TN1

                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK   = 1100
104000                  ERROR   = EMT           ;;BASIC DEFINITION OF ERROR CALL
000004                  SCOPE   = IOT           ;;BASIC DEFINITION OF SCOPE CALL

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT      = 11            ;;CODE FOR HORIZONTAL TAB
000012                  LF      = 12            ;;CODE FOR LINE FEED
000015                  CR      = 15            ;;CODE FOR CARRIAGE RETURN
000200                  CRLF    = 200           ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                  PS      = 177776        ;;PROCESSOR STATUS WORD
177776                  PSW=PS
177774                  STKLMT  = 177774        ;;STACK LIMIT REGISTER
177772                  PIRQ    = 177772        ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR    = 177570        ;;HARDWARE SWITCH REGISTER
177570                  DDISP   = 177570        ;;HARDWARE DISPLAY REGISTER

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0      = %0            ;;GENERAL REGISTER
000001                  R1      = %1            ;;GENERAL REGISTER
000002                  R2      = %2            ;;GENERAL REGISTER
000003                  R3      = %3            ;;GENERAL REGISTER
```

BASIC DEFINITIONS

```
000004                  R4      = %4            ;;GENERAL REGISTER
000005                  R5      = %5            ;;GENERAL REGISTER
000006                  R6      = %6            ;;GENERAL REGISTER
000007                  R7      = %7            ;;GENERAL REGISTER
000006                  SP      = %6            ;;STACK POINTER
000007                  PC      = %7            ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0     = 0             ;;PRIORITY LEVEL 0
000040                  PR1     = 40            ;;PRIORITY LEVEL 1
000100                  PR2     = 100           ;;PRIORITY LEVEL 2
000140                  PR3     = 140           ;;PRIORITY LEVEL 3
000200                  PR4     = 200           ;;PRIORITY LEVEL 4
000240                  PR5     = 240           ;;PRIORITY LEVEL 5
000300                  PR6     = 300           ;;PRIORITY LEVEL 6
000340                  PR7     = 340           ;;PRIORITY LEVEL 7

                        ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
100000                  SW15    = 100000
040000                  SW14    = 40000
020000                  SW13    = 20000
010000                  SW12    = 10000
004000                  SW11    = 4000
002000                  SW10    = 2000
001000                  SW09    = 1000
000400                  SW08    = 400
000200                  SW07    = 200
000100                  SW06    = 100
000040                  SW05    = 40
000020                  SW04    = 20
000010                  SW03    = 10
000004                  SW02    = 4
000002                  SW01    = 2
000001                  SW00    = 1
001000                  SW9=SW09
000400                  SW8=SW08
000200                  SW7=SW07
000100                  SW6=SW06
000040                  SW5=SW05
000020                  SW4=SW04
000010                  SW3=SW03
000004                  SW2=SW02
000002                  SW1=SW01
000001                  SW0=SW00

                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15   = 100000
040000                  BIT14   = 40000
020000                  BIT13   = 20000
010000                  BIT12   = 10000
004000                  BIT11   = 4000
002000                  BIT10   = 2000
001000                  BIT09   = 1000
000400                  BIT08   = 400
000200                  BIT07   = 200
000100                  BIT06   = 100
000040                  BIT05   = 40
```

BASIC DEFINITIONS

```
                000020          BIT04   = 20
                000010          BIT03   = 10
                000004          BIT02   = 4
                000002          BIT01   = 2
                000001          BIT00   = 1
                001000          BIT9=BIT09
                000400          BIT8=BIT08
                000200          BIT7=BIT07
                000100          BIT6=BIT06
                000040          BIT5=BIT05
                000020          BIT4=BIT04
                000010          BIT3=BIT03
                000004          BIT2=BIT02
                000002          BIT1=BIT01
                000001          BIT0=BIT00

                                ;*BASIC "CPU" TRAP VECTOR ADDRESSES
                000004          ERRVEC  = 4             ;;TIME OUT AND OTHER ERRORS
                000010          RESVEC  = 10            ;;RESERVED AND ILLEGAL INSTRUCTIONS
                000014          TBITVEC = 14            ;;"T" BIT
                000014          TRTVEC  = 14            ;;TRACE TRAP
                000014          BPTVEC  = 14            ;;BREAKPOINT TRAP (BPT)
                000020          IOTVEC  = 20            ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                000024          PWRVEC  = 24            ;;POWER FAIL
                000030          EMTVEC  = 30            ;;EMULATOR TRAP (EMT) **ERROR**
                000034          TRAPVEC = 34            ;;"TRAP" TRAP
                000060          TKVEC   = 60            ;;TTY KEYBOARD VECTOR
                000064          TPVEC   = 64            ;;TTY PRINTER VECTOR
                000240          PIRQVEC = 240           ;;PROGRAM INTERRUPT REQUEST VECTOR
    493
    494                         .SBTTL  RM80 REGISTER BIT DEFINITIONS
    495
    496                         ;*RMCS1 CONTROL STATUS REGISTER
    497
    498         004000          DVA     = BIT11                 ;DEVICE AVAILABLE-READ ONLY
    499         000040          F4      = BIT05                 ;FUNCTION CODE
    500         000020          F3      = BIT04                 ;FUNCTION CODE
    501         000010          F2      = BIT03                 ;FUNCTION CODE
    502         000004          F1      = BIT02                 ;FUNCTION CODE
    503         000002          F0      = BIT01                 ;FUNCTION CODE
    504         000001          GO      = BIT00                 ;GO BIT
    505         000077          FNCMSK  = 000077                ;FUNCTION CODE MASK
    506
    507                         ;FUNCTION CODES (BITS 01-05 OF RMCS1)
    508         000000          NOP     = 000000                ;NOP COMMAND
    509         000002          ILF02   = 000002                ;ILLEGAL COMMAND
    510         000004          SEEK    = 000004                ;SEEK COMMAND
    511         000006          RECAL   = 000006                ;RECALIBRATE COMMAND
    512         000010          DRVCLR  = 000010                ;DRIVE CLEAR COMMAND
    513         000012          RLEASE  = 000012                ;RELEASE COMMAND
    514         000014          OFFSET  = 000014                ;OFFSET COMMAND
    515         000016          RTC     = 000016                ;RETURN TO CENTERLINE COMMAND
    516         000020          RIP     = 000020                ;READ IN PRESET COMMAND
    517         000022          PAKACK  = 000022                ;PACK ACKNOWLEDGE COMMAND
    518         000022          PALACK  = PAKACK
    519         000024          ILF24   = 000024                ;ILLEGAL COMMAND
    520         000026          ILF26   = 000026                ;ILLEGAL COMMAND
```

RM80 REGISTER BIT DEFINITIONS

```
                000030          SEARCH  = 000030                ;SEARCH COMMAND
                000030          ILF30   = 000030                ;ILLEGAL COMMAND
                000032          ILF32   = 000032                ;ILLEGAL COMMAND
                000034          ILF34   = 000034                ;ILLEGAL COMMAND
                000036          ILF36   = 000036                ;ILLEGAL COMMAND
                000040          ILF40   = 000040                ;ILLEGAL COMMAND
                000042          ILF42   = 000042                ;ILLEGAL COMMAND
                000044          ILF44   = 000044                ;ILLEGAL COMMAND
                000046          ILF46   = 000046                ;ILLEGAL COMMAND
                000050          WCD     = 000050                ;WRITE CHECK DATA COMMAND
                000052          WCH     = 000052                ;WRITE CHECK HEADER AND DATA
                000054          ILF54   = 000054                ;ILLEGAL COMMAND
                000056          ILF56   = 000056                ;ILLEGAL COMMAND
                000060          WD      = 000060                ;WRITE DATA COMMAND
                000062          WH      = 000062                ;WRITE HEADER AND DATA COMMAND
                000064          ILF64   = 000064                ;ILLEGAL COMMAND
                000066          ILF66   = 000066                ;ILLEGAL COMMAND
                000070          RD      = 000070                ;READ DATA COMMAND
                000072          RH      = 000072                ;READ HEADER AND DATA COMMAND
                000074          ILF74   = 000074                ;ILLEGAL COMMAND
                000076          ILF76   = 000076                ;ILLEGAL COMMAND

                                ;*RMDA  DISK ADDRESS REGISTER

                                ;TRACK ADDRESS DEFINITIONS
                004000          TA8     = BIT11                 ;TRACK ADDRESS 8.
                002000          TA4     = BIT10                 ;TRACK ADDRESS 4
                001000          TA2     = BIT09                 ;TRACK ADDRESS 2
                000400          TA1     = BIT08                 ;TRACK ADDRESS 1

                                ;SECTOR ADDRESS DEFINITIONS
                000020          SA16    = BIT04                 ;SECTOR ADDRESS 16.
                000010          SA8     = BIT03                 ;SECTOR ADDRESS 8.
                000004          SA4     = BIT02                 ;SECTOR ADDRESS 4
                000002          SA2     = BIT01                 ;SECTOR ADDRESS 2
                000001          SA1     = BIT00                 ;SECTOR ADDRESS 1

                                ;TRACK & SECTOR MASKS
                177400          TADMSK  = 177400                ;TRACK ADDRESS MASK
                000377          SADMSK  = 000377                ;SECTOR ADDRESS MASK

                                ;*RMDS  DRIVE STATUS REGISTER

                100000          ATA     = BIT15                 ;ATTENTION ACTIVE
                040000          ERR     = BIT14                 ;COMPOSITE ERROR
                020000          PIP     = BIT13                 ;POSITIONING IN PROGRESS
                010000          MOL     = BIT12                 ;MEDIUM ON LINE
                004000          WRL     = BIT11                 ;WRITE LOCK
                002000          LBT     = BIT10                 ;LAST BLOCK TRANSFERRED
                001000          PGM     = BIT09                 ;PROGRAMMABLE
                000400          DPR     = BIT08                 ;DRIVE PRESENT
                000200          DRY     = BIT07                 ;DRIVE READY
                000100          VV      = BIT06                 ;VOLUME VALID
                000001          OM      = BIT00                 ;OFFSET MODE ACTIVE

                                ;*RMER1 ERROR REGISTER #1
```

RM80 REGISTER BIT DEFINITIONS

```
100000                  DCK     = BIT15                 ;DATA CHECK ERROR
040000                  UNS     = BIT14                 ;DRIVE UNSAFE
020000                  OPI     = BIT13                 ;OPERATION INCOMPLETE
010000                  DTE     = BIT12                 ;DRIVE TIMING ERROR
004000                  WLE     = BIT11                 ;WRITE LOCK ERROR
002000                  IAE     = BIT10                 ;INVALID ADDRESS ERROR
001000                  AOE     = BIT09                 ;ADDRESS OVERFLOW ERROR
000400                  HCRC    = BIT08                 ;HEADER CRC ERROR
000200                  HCE     = BIT07                 ;HEADER COMPARE ERROR
000100                  ECH     = BIT06                 ;ECC "HARD" ERROR
000040                  WCF     = BIT05                 ;WRITE CLOCK FAILURE
000020                  FER     = BIT04                 ;FORMAT ERROR
000010                  PAR     = BIT03                 ;PARITY ERROR
000004                  RMR     = BIT02                 ;REGISTER MODIFICATION REFUSED
000002                  ILR     = BIT01                 ;ILLEGAL REGISTER
000001                  ILF     = BIT00                 ;ILLEGAL FUNCTION

115760                  NDTMSK  = DCK!DTE!WLE!AOE!HCRC!HCE!ECH!WCF!FER
                        ;"NDTMSK" IS USED TO MASK ERROR REGISTER 1 DURING NON - DATA
                        ;COMMANDS, I.E., HOUSEKEEPING AND POSITIONING COMMANDS

                        ;*RMAS  ATTENTION SUMMARY REGISTER

000377                  ATNMSK  = 377                   ;MASK FOR ATTENTION BITS

                        ;*RMLA  LOOK AHEAD REGISTER

002000                  SC4     = BIT10                 ;SECTOR COUNT = 16
001000                  SC3     = BIT09                 ;SECTOR COUNT = 8
000400                  SC2     = BIT08                 ;SECTOR COUNT = 4
000200                  SC1     = BIT07                 ;SECTOR COUNT = 2
000100                  SC0     = BIT06                 ;SECTOR COUNT = 1

003700                  SCTMSK  = 003700                ;SECTOR COUNT MASK

                        ;*RMMR1 MAINTENANCE REGISTER #1

                        ;WRITE ONLY BITS
100000                  DBCK    = BIT15                 ;DEBUG CLOCK
040000                  DBEN    = BIT14                 ;DEBUG CLOCK ENABLE
020000                  DEBL    = BIT13                 ;DIAGNOSTIC END OF BLOCK
010000                  DTO     = BIT12                 ;DIAGNOSTIC TIMEOUT
004000                  MCLK    = BIT11                 ;MAINTENANCE CLOCK
002000                  MRD     = BIT10                 ;READ DATA
001000                  MUR     = BIT09                 ;UNIT READY
000400                  MOC     = BIT08                 ;ON CYLINDER
000200                  MSER    = BIT07                 ;SEEK ERROR
000100                  MDF     = BIT06                 ;DRIVE FAULT
000040                  MS      = BIT05                 ;SECTOR PULSE
000010                  MWP     = BIT03                 ;WRITE PROTECT
000004                  MI      = BIT02                 ;INDEX PULSE
000002                  MSC     = BIT01                 ;SECTOR COMPARE
000001                  DMD     = BIT00                 ;DIAGNOSTIC MODE

                        ;READ ONLY BITS
100000                  OCC     = BIT15                 ;OCCUPIED
040000                  RG      = BIT14                 ;RUN AND GO
```

```
RM80 REGISTER BIT DEFINITIONS

630          020000                  EBL     = BIT13                 ;END OF BLOCK
631          010000                  REX     = BIT12                 ;EXCEPTION
632          004000                  ESRC    = BIT11                 ;ENABLE SEARCH
633          002000                  PLFS    = BIT10                 ;LOOKING FOR SYNC
634          001000                  ECRC    = BIT09                 ;ENABLE CRC OUT
635          000400                  PDA     = BIT08                 ;DATA AREA
636          000200                  PHA     = BIT07                 ;HEADER AREA
637          000100                  CONT    = BIT06                 ;CONTINUE
638          000040                  WC      = BIT05                 ;WORD CLOCK
639          000020                  EECC    = BIT04                 ;ENABLE ECC OUT
640          000010                  MWD     = BIT03                 ;WRITE DATA BIT
641          000004                  LS      = BIT02                 ;LAST SECTOR
642          000002                  LST     = BIT01                 ;LAST SECTOR AND TRACK
643          000001                  DMD     = BIT00                 ;DIAGNOSTIC MODE
644
645                                  ;*RMDT  DRIVE TYPE REGISTER
646
647          100000                  NSA     = BIT15                 ;NOT SECTOR ADDRESSED = 0
648          040000                  TAP     = BIT14                 ;TAPE DRIVE = 0
649          020000                  MOH     = BIT13                 ;MOVING HEAD = 1
650          004000                  DRQ     = BIT11                 ;DRIVE REQUEST REQUIRED
651
652          020026                  SNGPRT  = 020026                ;SINGLE PORT DRIVE TYPE
653          024026                  DULPRT  = 024026                ;DUAL PORT DRIVE TYPE
654
655                                  ;*RMOF  OFFSET REGISTER
656
657          010000                  FMT16   = BIT12                 ;16 BIT WORD FORMAT
658          004000                  ECI     = BIT11                 ;ECC INHIBIT
659          002000                  HCI     = BIT10                 ;HEADER COMPARE INHIBIT
660          001000                  SSEI    = BIT09                 ;SKIP SECTOR ERROR INHIBIT
661          000200                  OFD     = BIT07                 ;OFFSET FORWARD
662
663                                  ;*RMDC  DESIRED CYLINDER ADDRESS REGISTER
664
665          001777                  CYLMSK  = 001777                ;MASK FOR CYLINDER ADDRESS
666
667                                  ;*RMMR2 MAINTENANCE REGISTER #2
668
669                                  ;READ ONLY BITS
670          100000                  RQA     = BIT15                 ;PORT A REQUEST
671          040000                  RQB     = BIT14                 ;PORT B REQUEST
672          020000                  TAG     = BIT13                 ;TAG CONTROL
673          010000                  TST     = BIT12                 ;COMMAND SEQUENCE TEST BIT
674          004000                  CC      = BIT11                 ;CONTROL OR CYLINDER TAG
675          002000                  CH      = BIT10                 ;CONTROL OR HEAD TAG
678          001000                  BB09    = BIT09                 ;TAG BUS
             000400                  BB08    = BIT08                 ;TAG BUS
             000200                  BB07    = BIT07                 ;TAG BUS
             000100                  BB06    = BIT06                 ;TAG BUS
             000040                  BB05    = BIT05                 ;TAG BUS
             000020                  BB04    = BIT04                 ;TAG BUS
             000010                  BB03    = BIT03                 ;TAG BUS
             000004                  BB02    = BIT02                 ;TAG BUS
             000002                  BB01    = BIT01                 ;TAG BUS
             000001                  BB00    = BIT00                 ;TAG BUS
679
```

RM80 REGISTER BIT DEFINITIONS

```
                                ;*RMER2 ERROR REGISTER 2

100000                          BSE     = BIT15                 ;BAD SECTOR ERROR
040000                          SKI     = BIT14                 ;SEEK INCOMPLETE
020000                          OPE     = BIT13                 ;OPERATOR PLUG ERROR
010000                          IVC     = BIT12                 ;INVALID COMMAND ERROR
004000                          LSC     = BIT11                 ;LOSS OF SYSTEM CLOCK
002000                          LBC     = BIT10                 ;LOSS OF BIT CLOCK
000200                          DVC     = BIT07                 ;DEVICE CHECK
000040                          SSE     = BIT05                 ;SKIP SECTOR ERROR
000010                          DPE     = BIT03                 ;DATA PARITY ERROR

                                .SBTTL  PROGRAM MNEMONICS

100000                          MSE     = BIT15                 ;MANUFACTURING DETECTED SECTOR ERROR
040000                          USE     = BIT14                 ;USER DETECTED SECTOR ERROR
020000                          SSF     = BIT13                 ;SKIP SECTOR FAILURE

                                .SBTTL  RM80 REGISTER INDEX VALUES

000000                          RMCS1   = 00                    ;CONTROL STATUS REGISTER #1
000006                          RMDA    = 06                    ;DISK ADDRESS REGISTER
000012                          RMDS    = 12                    ;DRIVE STATUS REGISTER
000014                          RMER1   = 14                    ;ERROR REGISTER #1
000016                          RMAS    = 16                    ;ATTENTION SUMMARY REGISTER
000020                          RMLA    = 20                    ;LOOK AHEAD REGISTER
000024                          RMMR1   = 24                    ;MAINTENANCE REGISTER
000026                          RMDT    = 26                    ;DRIVE TYPE REGISTER
000030                          RMSN    = 30                    ;SERIAL NUMBER REGISTER
000032                          RMOF    = 32                    ;OFFSET REGISTER
000034                          RMDC    = 34                    ;DESIRED CYLINDER REGISTER
000036                          RMHR    = 36                    ;HOLDING REGISTER
000040                          RMMR2   = 40                    ;MAINTENANCE REGISTER #2
000042                          RMER2   = 42                    ;FRROR REGISTER #2
000044                          RMEC1   = 44                    ;ECC POSITION REGISTER
000046                          RMEC2   = 46                    ;ECC PATTERN REGISTER
000050                          ILRG50  = 50                    ;ILLEGAL REGISTER 50
000052                          ILRG52  = 52                    ;ILLEGAL REGISTER 52
000054                          ILRG54  = 54                    ;ILLEGAL REGISTER 54
000056                          ILRG56  = 56                    ;ILLEGAL REGISTER 56
000060                          ILRG60  = 60                    ;ILLEGAL REGISTER 60
000062                          ILRG62  = 62                    ;ILLEGAL REGISTER 62
000064                          ILRG64  = 64                    ;ILLEGAL REGISTER 64
000066                          ILRG66  = 66                    ;ILLEGAL REGISTER 66
000070                          ILRG70  = 70                    ;ILLEGAL REGISTER 70
000072                          ILRG72  = 72                    ;ILLEGAL REGISTER 72
000074                          ILRG74  = 74                    ;ILLEGAL REGISTER 74
000076                          ILRG76  = 76                    ;ILLEGAL REGISTER 76

000077                          IDXMSK  = 77                    ;MASK FOR REGISTER INDEX NUMBER

                                .SBTTL  RH CONTROLLER REGISTER BIT DEFINITIONS

                                ;*RMCS1 CONTROL STATUS REGISTER #1

100000                          SC      = BIT15                 ;SPECIAL CONDITION-READ ONLY
040000                          TRE     = BIT14                 ;TRANSFER ERROR
```

```
                        RH CONTROLLER REGISTER BIT DEFINITIONS

                020000          MCPE    = BIT13                 ;MASSBUS CONTROL BUS PARITY ERROR-READ ONLY
                002000          PSEL    = BIT10                 ;PORT B SELECT
                001000          A17     = BIT09                 ;ADDRESS EXTENSION
                000400          A16     = BIT08                 ;ADDRESS EXTENSION
                000200          RDY     = BIT07                 ;READY-READ ONLY
                000100          IE      = BIT06                 ;INTERRUPT ENABLE

                                ;*RMCS2 RH CONTROL STATUS REGISTER #2

                100000          DLT     = BIT15                 ;DATA LATE-READ ONLY
                040000          WCE     = BIT14                 ;WRITE CHECK ERROR-READ ONLY
                020000          UPE     = BIT13                 ;UNIBUS PARITY ERROR
                010000          NED     = BIT12                 ;NONEXISTANT DRIVE-READ ONLY
                004000          NEM     = BIT11                 ;NONEXISTANT MEMORY-READ ONLY
                002000          PGE     = BIT10                 ;PROGRAM ERROR-READ ONLY
                001000          MXF     = BIT09                 ;MISSED TRANSFER
                000400          MDPE    = BIT08                 ;MASSBUS DATA BUS PARITY ERROR-READ ONLY
                000200          OR      = BIT07                 ;OUTPUT READY-READ ONLY
                000100          IR      = BIT06                 ;INPUT READY-READ ONLY
                000040          CLR     = BIT05                 ;CONTROLLER CLEAR
                000020          PAT     = BIT04                 ;PARITY TEST
                000010          BAI     = BIT03                 ;UNIBUS ADDRESS INCREMENT INHIBIT
                000004          U2      = BIT02                 ;UNIT SELECT
                000002          U1      = BIT01                 ;UNIT SELECT
                000001          U0      = BIT00                 ;UNIT SELECT

                                ;UNIT SELECT MASK

                000007          UNTMSK  = 7                     ;UNIT SELECT MASK

                                ;*RMCS3 RH70 CONTROL STATUS REGISTER #3

                100000          APE     = BIT15                 ;ADDRESS PARITY ERROR
                040000          DPEHI   = BIT14                 ;DATA PARITY ERROR HIGH WORD
                020000          DPELO   = BIT13                 ;DATA PARITY ERROR LOW WORD
                010000          WCEHI   = BIT12                 ;WRITE CHECK ERROR HIGH WORD
                004000          WCELO   = BIT11                 ;WRITE CHECK ERROR LOW WORD
                002000          DBL     = BIT10                 ;DOUBLE WORD TRANSFER
                000100          IE      = BIT06                 ;INTERRUPT ENABLE
                000010          IPCK3   = BIT03                 ;INVERT PARITY CHECK
                000004          IPCK2   = BIT02                 ;INVERT PARITY CHECK
                000002          IPCK1   = BIT01                 ;INVERT PARITY CHECK
                000001          IPCK0   = BIT00                 ;INVERT PARITY CHECK

                                .SBTTL  RH CONTROLLER REGISTER INDEX VALUES

                000000          RMCS1   = 00                    ;CONTROL, STATUS REGISTER #1
                000002          RMWC    = 02                    ;WORD COUNT REGISTER
                000004          RMBA    = 04                    ;BUS ADDRESS REGISTER
                000010          RMCS2   = 10                    ;CONTROL, STATUS REGISTER #2
                000022          RMDB    = 22                    ;DATA BUFFER
                000050          RMBAE   = 50                    ;BUS ADDRESS EXTENSION
                000052          RMCS3   = 52                    ;CONTROL, STATUS REGISTER #3

                176700          ABASE   = 176700                ;UNIBUS ADDRESS
                120254          AVECT1  = 120254                ;UNIBUS VECTOR ADDRESS AND PRIORITY
```

```
                                .SBTTL  TRAP CATCHER

                000000                  .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                000174          .=174
  000174        000000  DISPREG: .WORD  0              ;;SOFTWARE DISPLAY REGISTER
  000176        000000  SWREG:   .WORD  0              ;;SOFTWARE SWITCH REGISTER

                                .SBTTL  STARTING ADDRESS(ES)

  000200        000137  005434          JMP     @#START         ;;JUMP TO STARTING ADDRESS OF PROGRAM
2
3 000204        000137  005424          JMP     @#START1        ;CHANGE RH/RM BUS ADDRESS
4
5                               .SBTTL  ACT11 HOOKS

                                ;;**************************************************************
                                ;HOOKS REQUIRED BY ACT11
                000210          $SVPC=.                 ;SAVE PC
                000046          .=46
  000046        031402          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                000052          .=52
  000052        000000          .WORD   0               ;;2)SET LOC.52 TO ZERO
                000210          .=$SVPC                 ;; RESTORE PC
6
7               001100  .=1100
8                       .SBTTL  APT PARAMETER BLOCK

                                ;;**************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;**************************************************************
                001100          .$X=.   ;;SAVE CURRENT LOCATION
                000024          .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
  000024        000200          200     ;;FOR APT START UP
                000044          .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
  000044        001100          $APTHDR ;;POINT TO APT HEADER BLOCK
                001100          .=.$X   ;;RESET LOCATION COUNTER
                                ;;**************************************************************
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

  001100                        $APTHD:
  001100        000000  $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
  001102        001222  $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
  001104        000024  $TSTM:  .WORD   20.     ;;RUN TIM OF LONGEST TEST
  001106        000024  $PASTM: .WORD   20.     ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
  001110        000024  $UNITM: .WORD   20.     ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDED UNIT
  001112        000042          .WORD   $ETEND-$MAIL/2  ;;LENGTH MAILBOX-ETABLE(WORDS)
9               001114  TAGADR=.
```

```
      0                                 .SBTTL  COMMON TAGS

                                        ;;**********************************************************************
                                        ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                        ;*USED IN THE PROGRAM.

            001114                              .=TAGADR
      001114                            $CMTAG:                     ;;START OF COMMON TAGS
      001114  000000                            .WORD   0
      001116     000                    $TSTNM: .BYTE   0           ;;CONTAINS THE TEST NUMBER
      001117     000                    $ERFLG: .BYTE   0           ;;CONTAINS ERROR FLAG
      001120  000000                    $ICNT:  .WORD   0           ;;CONTAINS SUBTEST ITERATION COUNT
      001122  000000                    $LPADR: .WORD   0           ;;CONTAINS SCOPE LOOP ADDRESS
      001124  000000                    $LPERR: .WORD   0           ;;CONTAINS SCOPE RETURN FOR ERRORS
      001126  000000                    $ERTTL: .WORD   0           ;;CONTAINS TOTAL ERRORS DETECTED
      001130     000                    $ITEMB: .BYTE   0           ;;CONTAINS ITEM CONTROL BYTE
      001131     001                    $ERMAX: .BYTE   1           ;;CONTAINS MAX. ERRORS PER TEST
      001132  000000                    $ERRPC: .WORD   0           ;;CONTAINS PC OF LAST ERROR INSTRUCTION
      001134  000000                    $GDADR: .WORD   0           ;;CONTAINS ADDRESS OF 'GOOD' DATA
      001136  000000                    $BDADR: .WORD   0           ;;CONTAINS ADDRESS OF 'BAD' DATA
      001140  000000                    $GDDAT: .WORD   0           ;;CONTAINS 'GOOD' DATA
      001142  000000                    $BDDAT: .WORD   0           ;;CONTAINS 'BAD' DATA
      001144  000000                            .WORD   0           ;;RESERVED--NOT TO BE USED
      001146  000000                            .WORD   0
      001150     000                    $AUTOB: .BYTE   0           ;;AUTOMATIC MODE INDICATOR
      001151     000                    $INTAG: .BYTE   0           ;;INTERRUPT MODE INDICATOR
      001152  000000                            .WORD   0
      001154  177570                    SWR:    .WORD   DSWR        ;;ADDRESS OF SWITCH REGISTER
      001156  177570                    DISPLAY: .WORD  DDISP       ;;ADDRESS OF DISPLAY REGISTER
      001160  177560                    $TKS:   177560              ;;TTY KBD STATUS
      001162  177562                    $TKB:   177562              ;;TTY KBD BUFFER
      001164  177564                    $TPS:   177564              ;;TTY PRINTER STATUS REG. ADDRESS
      001166  177566                    $TPB:   177566              ;;TTY PRINTER BUFFER REG. ADDRESS
      001170     000                    $NULL:  .BYTE   0           ;;CONTAINS NULL CHARACTER FOR FILLS
      001171     002                    $FILLS: .BYTE   2           ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
      001172     012                    $FILLC: .BYTE   12          ;;INSERT FILL CHARS. AFTER A "LINE FEED"
      001173     000                    $TPFLG: .BYTE   0           ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
      001174  000000                    $TMP0:  .WORD   0           ;;USER DEFINED
      001176  000000                    $TMP1:  .WORD   0           ;;USER DEFINED
      001200  000000                    $TMP2:  .WORD   0           ;;USER DEFINED
      001202  000000                    $TMP3:  .WORD   0           ;;USER DEFINED
      001204  000000                    $TMP4:  .WORD   0           ;;USER DEFINED
      001206  000000                    $TIMES: 0                   ;;MAX. NUMBER OF ITERATIONS
      001210  000000                    $ESCAPE:0                   ;;ESCAPE ON ERROR ADDRESS
      001212     207     377     377     $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
      001216     077                     $QUES:  .ASCII  /?/         ;;QUESTION MARK
      001217     015                     $CRLF:  .ASCII  <15>        ;;CARRIAGE RETURN
      001220     012     000             $LF:    .ASCIZ  <12>        ;;LINE FEED
                                        ;;**********************************************************************
                                        .SBTTL  APT MAILBOX-ETABLE

                                        ;;**********************************************************************
                                        .EVEN
      001222                            $MAIL:                      ;;APT MAILBOX
      001222  000000                    $MSGTY: .WORD   AMSGTY       ;;MESSAGE TYPE CODE
      001224  000000                    $FATAL: .WORD   AFATAL       ;;FATAL ERROR NUMBER
      001226  000000                    $TESTN: .WORD   ATESTN       ;;TEST NUMBER
```

APT MAILBOX-ETABLE

```
001230  000000                  $PASS:  .WORD   APASS   ;;PASS COUNT
001232  000000                  $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
001234  000000                  $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
001236  000000                  $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
001240  000000                  $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
001242                          $ETABLE:                ;;APT ENVIRONMENT TABLE
001242     000                  $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
001243     000                  $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
001244  000000                  $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
001246  000000                  $USWR:  .WORD   AUSWR   ;;USER SWITCHES
001250  000000                  $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
                                :*                      BITS 15-11=CPU TYPE
                                :*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                :*                              11/70=06,PDQ=07,Q=10
                                :*                      BIT 10=REAL TIME CLOCK
                                :*                      BIT  9=FLOATING POINT PROCESSOR
                                :*                      BIT  8=MEMORY MANAGEMENT
001252     000                  $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
001253     000                  $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
                                :*                      MEM.TYPE BYTE   --  (HIGH BYTE)
                                :*                              900 NSEC CORE=001
                                :*                              300 NSEC BIPOLAR=002
                                :*                              500 NSEC MOS=003
001254  000000                  $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
                                :*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
001256     000                  $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
001257     000                  $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
001260  000000                  $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
001262     000                  $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
001263     000                  $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
001264  000000                  $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
001266     000                  $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
001267     000                  $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
001270  000000                  $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
001272  120254                  $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
001274  000000                  $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
001276  176700                  $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
001300  000000                  $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
001302  000000                  $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
001304  000000                  $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
001306  000000                  $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
001310  000000                  $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
001312  000000                  $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
001314  000000                  $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
001316  000000                  $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
001320  000000                  $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
001322  000000                  $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
001324  000000                  $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
001326                          $ETEND:
                                .MEXIT
```

USER DEFINED TAGS

```
                                .SBTTL  USER DEFINED TAGS

001326  000000                  CTLFG:  .WORD   0       ;CONTAINS CONTROL-C FLAG
001330  000000                  CHGADR: .WORD   0       ;CHANGE RH/RM BUS ADDRESS = -1, NO CHANGE = 0
001332  000000                  XXDP:   .WORD   0       ;THE LOW BYTE CONTAINS THE DRIVE NUMBER FROM WHICH
                                                        ;THE PROGRAM WAS LOADED. THE HIGH BYTE CONTAINS THE
                                                        ;'XXDP' DEVICE CODE FOR THE RM80.
001334      000                 LSTRK:  .BYTE   0       ;LO BYTE = 0
001335      015                         .BYTE   13.     ;HI BYTE, CONTAINS LAST TRACK ADDRESS OF UNIT
                                                        ;UNDER TEST. RM80 = 13.

                                ;THE REGISTER INPUT BUFFER IS USED FOR
                                ;STORING DRIVE STATUS

001336                          GETBUF:

                                ;REGISTER INPUT BUFFER
001336  000000                  RMCS1I: .WORD   0       ;CONTROL, STATUS REGISTER #1
001340  000000                  RMWCI:  .WORD   0       ;WORD COUNT REGISTER
001342  000000                  RMBAI:  .WORD   0       ;BUS ADDRESS REGISTER
001344  000000                  RMDAI:  .WORD   0       ;DISK ADDRESS REGISTER
001346  000000                  RMCS2I: .WORD   0       ;CONTROL, STATUS REGISTER #2
001350  000000                  RMDSI:  .WORD   0       ;DRIVE STATUS REGISTER
001352  000000                  RMER1I: .WORD   0       ;ERROR REGISTER #1
001354  000000                  RMASI:  .WORD   0       ;ATTENTION SUMMARY REGISTER
001356  000000                  RMLAI:  .WORD   0       ;LOOK AHEAD REGISTER
001360  000000                  RMDBI:  .WORD   0       ;DATA BUFFER
001362  000000                  RMMR1I: .WORD   0       ;MAINTENANCE REGISTER #1
001364  000000                  RMDTI:  .WORD   0       ;DRIVE TYPE REGISTER
001366  000000                  RMSNI:  .WORD   0       ;SERIAL NUMBER REGISTER
001370  000000                  RMOFI:  .WORD   0       ;OFFSET REGISTER
001372  000000                  RMDCI:  .WORD   0       ;DESIRED CYLINDER REGISTER
001374  000000                  RMHRI:  .WORD   0       ;HOLDING REGISTER
001376  000000                  RMMR2I: .WORD   0       ;MAINTENANCE REGISTER #2
001400  000000                  RMER2I: .WORD   0       ;ERROR REGISTER #2
001402  000000                  RMEC1I: .WORD   0       ;ECC POSITION REGISTER
001404  000000                  RMEC2I: .WORD   0       ;ECC PATTERN REGISTER
001406  000000                  RMBAEI: .WORD   0       ;BUS ADDRESS EXTENSION REGISTER
001410  000000                  RMCS3I: .WORD   0       ;CONTROL, STATUS REGISTER #3

                                ;THE REGISTER OUTPUT BUFFER IS USED FOR
                                ;ASSEMBLING DATA GOING TO REGISTER

0014.2                          PUTBUF:

                                ;REGISTER OUTPUT BUFFER
001412  000000                  RMCS1O: .WORD   0       ;CONTROL, STATUS REGISTER #1
001414  000000                  RMWCO:  .WORD   0       ;WORD COUNT REGISTER
001416  000000                  RMBAO:  .WORD   0       ;BUS ADDRESS REGISTER
001420  000000                  RMDAO:  .WORD   0       ;DISK ADDRESS REGISTER
001422  000000                  RMCS2O: .WORD   0       ;CONTROL, STATUS REGISTER #2
001424  000000                  RMDSO:  .WORD   0       ;DRIVE STATUS REGISTER
001426  000000                  RMER1O: .WORD   0       ;ERROR REGISTER #1
001430  000000                  RMASO:  .WORD   0       ;ATTENTION SUMMARY REGISTER
001432  000000                  RMLAO:  .WORD   0       ;LOOK AHEAD REGISTER
001434  000000                  RMDBO:  .WORD   0       ;DATA BUFFER
001436  000000                  RMMR1O: .WORD   0       ;MAINTENANCE REGISTER #1
```

USER DEFINED TAGS

```
001440  000000                  RMDTO:  .WORD   0       ;DRIVE TYPE REGISTER
001442  000000                  RMSNO:  .WORD   0       ;SERIAL NUMBER REGISTER
001444  000000                  RMOFO:  .WORD   0       ;OFFSET REGISTER
001446  000000                  RMDCO:  .WORD   0       ;DESIRED CYLINDER REGISTER
001450  000000                  RMHRO:  .WORD   0       ;HOLDING REGISTER
001452  000000                  RMMR2O: .WORD   0       ;MAINTENANCE REGISTER #2
001454  000000                  RMER2O: .WORD   0       ;ERROR REGISTER #2
001456  000000                  RMEC1O: .WORD   0       ;ECC POSITION REGISTER
001460  000000                  RMEC2O: .WORD   0       ;ECC PATTERN REGISTER
001462  000000                  RMBAEO: .WORD   0       ;BUS ADDRESS EXTENSION REGISTER
001464  000000                  RMCS3O: .WORD   0       ;CONTROL, STATUS REGISTER #3

                                ;EACH WORD OF THE TEST QUE CONTAINS THE DEVICE NUMBER IN
                                ;THE LOW BYTE AND THE ATTENTION BIT IN THE HIGH BYTE. THE
                                ;FIRST WORD CONTAINS THE ADDRESS OF THE DEVICE UNDER TEST
                                ;IN THE TABLE. A ZERO WORD IS A BLANK AND REPRESENTS THE
                                ;END OF THE QUE.

001466  000000                  TSTQUE: .WORD   0               ;CONTAINS DEVICE POINTER
001470                                  .BLKW   8.              ;TEST QUE FOR DEVICES UNDER TEST
001510  000000                          .WORD   0               ;TABLE TERMINATOR GOES HERE WHEN
                                                                ;ALL 8. DEVICES ARE UNDER TEST.

                                ;MEDIA ENABLE IS SET IF THE BAD SECTOR FILES HAVE BEEN RECOVERED
                                ;FOR THE UNIT UNDER TEST, OTHERWISE IT IS ZERO.
001512  000000                  MEDENB: .WORD   0               ;MEDIA ENABLE

                                ;SKIP SECTOR FAILURE ENABLE IS SET IF THE "SSF" BIT SHOULD BE
                                ;SET IN THE FIRST HEADER WORD WHEN THE FE CYLINDERS ARE BEING
                                ;REFORMATTED.
001514  000000                  SSFENB: .WORD   0               ;SSF ENABLE

                                ;LOCATIONS "ASNDC" AND "ASNDC" CONTAIN THE CYLINDER, TRACK AND SECTOR
                                ;ADDRESS ASSIGNED BY THE BAD SECTOR MODULE.
001516  000000                  ASNDC:  .WORD   0               ;ASSIGNED DESIRED CYLINDER
001520  000000                  ASNDA:  .WORD   0               ;ASSIGNED TRACK, AND SECTOR
001522  000000                  CLKADR: .WORD   0               ;UNIBUS ADDRESS OF KW11 CLOCK
001524  000000                  CLKVCT: .WORD   0               ;VECTOR ADDRESS OF KW11 CLOCK

                                ;THE GET INDEX TABLE CONTAINS A BYTE LIST OF REGISTERS WHICH
                                ;ARE READ BY THE GET SUBROUTINE.  THE LIST IS TERMINATED BY
                                ;A NEGATIVE BYTE.
001526                          GETINX: .BLKB   23.             ;GET INDEX TABLE

                                ;THE PUT INDEX TABLE ICONTAINS A BYTE LIST OF REGISTERS WHICH
                                ;ARE WRITTEN BY THE PUT SUBROUTINE.  THE LIST IS TERMINATED BY
                                ;A NEGATIVE BYTE.
001555                          PUTINX: .BLKB   23.             ;PUT INDEX TABLE

                                ;PUT TAGS HERE
```

```
                                .SBTTL  ERROR POINTER TABLE

                                ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                ;*      DH              ;;POINTS TO THE DATA HEADER
                                ;*      DT              ;;POINTS TO THE DATA
                                ;*      DF              ;;POINTS TO THE DATA FORMAT


  001604                        $ERRTB:
1
2
                                ;ERROR  1       WRONG UNIT SELECTED
3
  001604  065442                        EMT1
  001606  071600                        EHT1
  001610  071724                        EDT1
  001612  072014                        EFT1

4
5
                                ;ERROR  2       DEVICE WENT UNAVAILABLE
6
  001614  065446                        EMT2
  001616  071600                        EHT1
  001620  071724                        EDT1
  001622  072014                        EFT1

7
8
                                ;ERROR  3       DEVICE WENT NONEXISTENT
9
  001624  065454                        EMT3
  001626  071600                        EHT1
  001630  071724                        EDT1
  001632  072014                        EFT1

10
11
                                ;ERROR  4       CONTROLLER NOT READY
12
  001634  065462                        EMT4
  001636  071600                        EHT1
  001640  071724                        EDT1
  001642  072014                        EFT1

13
14
                                ;ERROR  5       DRIVE NOT READY AND GO NOT RESET
15
  001644  065470                        EMT5
  001646  071600                        EHT1
  001650  071724                        EDT1
  001652  072014                        EFT1

16
17
                                ;ERROR  6       UNEXPECTED VALUE FOR "ATA" STATUS
```

```
18
   001654  065476                       EMT6
   001656  071600                       EHT1
   001660  071724                       EDT1
   001662  072014                       EFT1

19
20                              ;ERROR  7       BUS TIMEOUT TRYING TO READ OR WRITE REGISTER
21
   001664  065504                       EMT7
   001666  000000                       0
   001670  000000                       0
   001672  000000                       0

22
23                              ;ERROR  10      DRIVE NOT READY BUT GO IS RESET
24
   001674  065512                       EMT10
   001676  071600                       EHT1
   001700  071724                       EDT1
   001702  072014                       EFT1

25
26                              ;ERROR  11      GO NOT RESET BUT DRIVE IS READY
27
   001704  065516                       EMT11
   001706  071600                       EHT1
   001710  071724                       EDT1
   001712  072014                       EFT1

28
29                              ;ERROR  12      INCORRECT FUNCTION CODE
30
   001714  065522                       EMT12
   001716  071600                       EHT1
   001720  071724                       EDT1
   001722  072014                       EFT1

31
32                              ;ERROR  13      PARITY ERROR READING REMOTE REGISTERS
33
   001724  065530                       EMT13
   001726  071600                       EHT1
   001730  071724                       EDT1
   001732  072014                       EFT1

34
35                              ;ERROR  14      TRANSFER ERROR IS INCORRECT
36
   001734  065542                       EMT14
   001736  071600                       EHT1
   001740  071724                       EDT1
   001742  072014                       EFT1

37
38                              ;ERROR  15      INCORRECT WORD COUNT
39
```

ERROR POINTER TABLE

```
        001744  065550                          EMT15
        001746  071600                          EHT1
        001750  071724                          EDT1
        001752  072014                          EFT1

     40
     41                             ;ERROR  16      INCORRECT BUS ADDRESS
     42
        001754  065556                          EMT16
        001756  071600                          EHT1
        001760  071724                          EDT1
        001762  072014                          EFT1

     43
     44                             ;ERROR  17      INCORRECT LBT STATUS
     45
        001764  065566                          EMT17
        001766  071600                          EHT1
        00177C  071724                          EDT1
        001772  072014                          EFT1

     46
     47                             ;ERROR  20      INCORRECT AOE
     48
        001774  065576                          EMT20
        001776  071600                          EHT1
        002000  071724                          EDT1
        002002  072014                          EFT1

     49
     50                             ;ERROR  21      INCORRECT DISK ADDRESS
     51
        002004  065606                          EMT21
        002006  071600                          EHT1
        002010  071724                          EDT1
        002012  072014                          EFT1

     52
     53                             ;ERROR  22      INCORRECT CYLINDER ADDRESS
     54
        002014  065616                          EMT22
        002016  071600                          EHT1
        002020  071724                          EDT1
        002022  072014                          EFT1

     55
     56                             ;ERROR  23      INCORRECT WLE STATUS
     57
        002024  065626                          EMT23
        002026  071600                          EHT1
        002030  071724                          EDT1
        002032  072014                          EFT1

     58
     59                             ;ERROR  24      INCORRECT UPE STATUS
     60
        002034  065636                          EMT24
```

ERROR POINTER TABLE

```
        002036  071600                          EHT1
        002040  071724                          EDT1
        002042  072014                          EFT1

     61
     62                             ;ERROR  25      INCORRECT WCF STATUS
     63
        002044  065646                          EMT25
        002046  071600                          EHT1
        002050  071724                          EDT1
        002052  072014                          EFT1

     64
     65                             ;ERROR  26      INCORRECT WCE STATUS
     66
        002054  065656                          EMT26
        002056  071600                          EHT1
        002060  071724                          EDT1
        002062  072014                          EFT1

     67
     68                             ;ERROR  27      INCORRECT MDPE STATUS
     69
        002064  065666                          EMT27
        002066  071600                          EHT1
        002070  071724                          EDT1
        002072  072014                          EFT1

     70
     71                             ;ERROR  30      INCORRECT DCK STATUS
     72
        002074  065676                          EMT30
        002076  071600                          EHT1
        002100  071724                          EDT1
        002102  072014                          EFT1

     73
     74                             ;ERROR  31      INCORRECT ECH STATUS
     75
        002104  065706                          EMT31
        002106  071600                          EHT1
        002110  071724                          EDT1
        002112  072014                          EFT1

     76
     77                             ;ERROR  32      DLT SHOULD NOT BE SET
     78
        002114  065716                          EMT32
        002116  071600                          EHT1
        002120  071724                          EDT1
        002122  072014                          EFT1

     79
     80                             ;ERROR  33      MXF SHOULD NOT BE SET
     81
        002124  065726                          EMT33
        002126  071600                          EHT1
```

ERROR POINTER TABLE

```
002130  071724                          EDT1
002132  072014                          EFT1

 82
 83                             ;ERROR  34      DTE SHOULD NOT BE SET
 84
002134  065736                          EMT34
002136  071600                          EHT1
002140  071724                          EDT1
002142  072014                          EFT1

 85
 86                             ;ERROR  35      INCORRECT HCRC STATUS
 87
002144  065746                          EMT35
002146  071600                          EHT1
002150  071724                          EDT1
002152  072014                          EFT1

 88
 89                             ;ERROR  36      INCORRECT HCE STATUS
 90
002154  065756                          EMT36
002156  071600                          EHT1
002160  071724                          EDT1
002162  072014                          EFT1

 91
 92                             ;ERROR  37      INCORRECT FER STATUS
 93
002164  065766                          EMT37
002166  071600                          EHT1
002170  071724                          EDT1
002172  072014                          EFT1

 94
 95                             ;ERROR  40      DPE SHOULD NOT BE SET (NOT A DATA COMMAND)
 96
002174  065776                          EMT40
002176  071600                          EHT1
002200  071724                          EDT1
002202  072014                          EFT1

 97
 98                             ;ERROR  41      LOST 'MOL' DURING PACK ACKNOWLEDGE
 99
002204  066004                          EMT41
002206  071600                          EHT1
002210  071724                          EDT1
002212  072014                          EFT1

100
101                            ;ERROR  42      UNSAFE ERROR DURING PACK ACKNOWLEDGE
102
002214  066014                          EMT42
002216  071600                          EHT1
002220  071724                          EDT1
```

ERROR POINTER TABLE

```
        002222  072014                          EFT1

    103
    104                             ;ERROR  43      "OPI" ERROR DURING PACK ACKNOWLEDGE
    105
        002224  066026                          EMT43
        002226  071600                          EHT1
        002230  071724                          EDT1
        002232  072014                          EFT1

    106
    107                             ;ERROR  44      "RMR" ERROR DURING PACK ACKNOWLEDGE
    108
        002234  066036                          EMT44
        002236  071600                          EHT1
        002240  071724                          EDT1
        002242  072014                          EFT1

    109
    110                             ;ERROR  45      "ILR" ERROR DURING PACK ACKNOWLEDGE
    111
        002244  066046                          EMT45
        002246  071600                          EHT1
        002250  071724                          EDT1
        002252  072014                          EFT1

    112
    113                             ;ERROR  46      "ILF" ERROR DURING PACK ACKNOWLEDGE
    114
        002254  066056                          EMT46
        002256  071600                          EHT1
        002260  071724                          EDT1
        002262  072014                          EFT1

    115
    116                             ;ERROR  47      COMPOSITE ERROR STATUS IS INCORRECT
    117
        002264  066066                          EMT47
        002266  071600                          EHT1
        002270  071724                          EDT1
        002272  072014                          EFT1

    118
    119                             ;ERROR  50      PARITY ERROR WRITING REMOTE REGISTERS
    120
        002274  066074                          EMT50
        002276  071600                          EHT1
        002300  071724                          EDT1
        002302  072014                          EFT1

    121
    122                             ;ERROR  51      INCORRECT IAE STATUS DURING SEEK COMMAND
    123
        002304  066104                          EMT51
        002306  071600                          EHT1
        002310  071724                          EDT1
        002312  072014                          EFT1
```

ERROR POINTER TABLE

```
                                        ;ERROR  52      OPI ERROR DURING SEEK - MEDIUM IS NOT ON LINE
002314  066116                                  EMT52
002316  071600                                  EHT1
002320  071724                                  EDT1
002322  072014                                  EFT1

                                        ;ERROR  53      OPI ERROR DURING SEEK - MEDIUM IS ON LINE, ASSUME
                                        ;               ON CYLINDER LATCH DIDN'T RESET
002324  066134                                  EMT53
002326  071600                                  EHT1
002330  071724                                  EDT1
002332  072014                                  EFT1

                                        ;ERROR  54      SEEK INCOMPLETE ERROR DURING SEEK COMMAND
002334  066152                                  EMT54
002336  071600                                  EHT1
002340  071724                                  EDT1
002342  072014                                  EFT1

                                        ;ERROR  55      DEVICE CHECK DURING SEEK COMMAND
002344  066162                                  EMT55
002346  071600                                  EHT1
002350  071724                                  EDT1
002352  072014                                  EFT1

                                        ;ERROR  56      PIP IS STILL SET AFTER SEEK - SKI IS RESET
002354  066174                                  EMT56
002356  071600                                  EHT1
002360  071724                                  EDT1
002362  072014                                  EFT1

                                        ;ERROR  57      ATA DID NOT SET DURING SEEK COMMAND
002364  066212                                  EMT57
002366  071600                                  EHT1
002370  071724                                  EDT1
002372  072014                                  EFT1

                                        ;ERROR  60      IVC ERROR DURING SEEK COMMAND - LOST
                                        ;               VOLUME VALID
002374  066222                                  EMT60
002376  071600                                  EHT1
002400  071724                                  EDT1
```

ERROR POINTER TABLE

```
        002402  072014                          EFT1

    147
    148                                 ;ERROR  61      ERRONEOUS IVC ERROR DURING SEEK COMMAND -
    149                                 ;               VOLUME VALID IS STIL SET
    150
        002404  066240                          EMT61
        002406  071600                          EHT1
        002410  071724                          EDT1
        002412  072014                          EFT1

    151
    152                                 ;ERROR  62      MOL IS ZERO, BUT OPI WAS NOT
    153                                 ;               REPORTED DURING SEEK COMMAND
    154
        002414  066260                          EMT62
        002416  071600                          EHT1
        002420  071724                          EDT1
        002422  072014                          EFT1

    155
    156                                 ;ERROR  63      SSE SHOULD NOT BE SET
    157
        002424  066274                          EMT63
        002426  071600                          EHT1
        002430  071724                          EDT1
        002432  072014                          EFT1

    158
    159                                 ;ERROR  64      DRIVE DID NOT DETECT ''IVC'' ERROR DURING SEEK
    160
        002434  066304                          EMT64
        002436  071600                          EHT1
        002440  071724                          EDT1
        002442  072014                          EFT1

    161
    162                                 ;ERROR  65      DRIVE EXECUTED A SEEK WITH ERROR SET
    163
        002444  066324                          EMT65
        002446  071600                          EHT1
        002450  071724                          EDT1
        002452  072014                          EFT1

    164
    165                                 ;ERROR  66      UNEXPECTED ERROR SET IN RMER1
    166
        002454  066344                          EMT66
        002456  071600                          EHT1
        002460  071724                          EDT1
        002462  072014                          EFT1

    167
    168                                 ;ERROR  67      UNEXPECTED ERROR SET IN RMER2
    169
        002464  066356                          EMT67
        002466  071600                          EHT1
```

ERROR POINTER TABLE

```
002470  071724                          EDT1
002472  072014                          EFT1

                                ;ERROR  70      ERRONEOUS ''IAE'' ERROR DURING RECALIBRATE

002474  066370                          EMT70
002476  071600                          EHT1
002500  071724                          EDT1
002502  072014                          EFT1

                                ;ERROR  71      ''ILF'' ERROR DURING RECALIBRATE

002504  066400                          EMT71
002506  071600                          EHT1
002510  071724                          EDT1
002512  072014                          EFT1

                                ;ERROR  72      ''OPI'' ERROR DURING RECALIBRATE DUE TO ''MOL'' = 0

002514  066410                          EMT72
002516  071600                          EHT1
002520  071724                          EDT1
002522  072014                          EFT1

                                ;ERROR  73      ''OPI'' ERROR DURING RECALIBRATE BECAUSE ON
                                ;               CYLINDER DIDNT DROP

002524  066426                          EMT73
002526  071600                          EHT1
002530  071724                          EDT1
002532  072014                          EFT1

                                ;ERROR  74      ''IVC'' ERROR DURING RECALIBRATE - ''VV'' = 0

002534  066444                          EMT74
002536  071600                          EHT1
002540  071724                          EDT1
002542  072014                          EFT1

                                ;ERROR  75      ERRONEOUS ''IVC'' ERROR DURING RECALIBRATE - ''VV'' = 1

002544  066454                          EMT75
002546  071600                          EHT1
002550  071724                          EDT1
002552  072014                          EFT1

                                ;ERROR  76      ''SKI'' ERROR DURING RECALIBRATE

002554  066474                          EMT76
002556  071600                          EHT1
```

ERROR POINTER TABLE

```
        002560  071724                          EDT1
        002562  072014                          EFT1

    192
    193                             ;ERROR  77      "DVC" OCCURRED DURING RECALIBRATE
    194
        002564  066504                          EMT77
        002566  071600                          EHT1
        002570  071724                          EDT1
        002572  072014                          EFT1

    195
    196                             ;ERROR  100     LOST "MOL" DURING RECALIBRATE - "DPI" = 0
    197
        002574  066516                          EMT100
        002576  071600                          EHT1
        002600  071724                          EDT1
        002602  072014                          EFT1

    198
    199                             ;ERROR  101     LOST "VV" DURING RECALIBRATE - "IVC" = 0
    200
        002604  066534                          EMT101
        002606  071600                          EHT1
        002610  071724                          EDT1
        002612  072014                          EFT1

    201
    202                             ;ERROR  102     "ATA" DID NOT SET DURING RECALIBRATE
    203
        002614  066552                          EMT102
        002616  071600                          EHT1
        002620  071724                          EDT1
        002622  072014                          EFT1

    204
    205                             ;ERROR  103     "DM" DID NOT RESET DURING RECALIBRATE
    206
        002624  066562                          EMT103
        002626  071600                          EHT1
        002630  071724                          EDT1
        002632  072014                          EFT1

    207
    208                             ;ERROR  104     "PIP" IS STIL SET AFTER RECALIBRATE
    209
        002634  066574                          EMT104
        002636  071600                          EHT1
        002640  071724                          EDT1
        002642  072014                          EFT1

    210
    211                             ;ERROR  105     UNEXPECTED "ILR" ERROR DURING RECALIBRATE
    212
        002644  066612                          EMT105
        002646  071600                          EHT1
        002650  071724                          EDT1
```

ERROR POINTER TABLE

```
        002652  072014                          EFT1

    213
    214                             ;ERROR  106     UNEXPECTED ''RMR'' ERROR DURING RECALIBRATE
    215
        002654  066622                          EMT106
        002656  071600                          EHT1
        002660  071724                          EDT1
        002662  072014                          EFT1

    216
    217                             ;ERROR  107     ''UNS'' ERROR DURING RECALIBRATE - AC POWER IS LOW
    218
        002664  066632                          EMT107
        002666  071600                          EHT1
        002670  071724                          EDT1
        002672  072014                          EFT1

    219
    220                             ;ERROR  110     CANNOT ACCESS MASSBUS CONTROLLER VIA UNIBUS
    221
        002674  066652                          EMT110
        002676  071622                          EHT110
        002700  071742                          EDT110
        002702  072032                          EFT110

    222
    223                             ;ERROR  111     NONEXISTENT DEVICE
    224
        002704  066664                          EMT111
        002706  071626                          EHT111
        002710  071744                          EDT111
        002712  072034                          EFT111

    225
    226                             ;ERROR  112     DEVICE NOT AVAILABLE
    227
        002714  066672                          EMT112
        002716  071626                          EHT111
        002720  071744                          EDT111
        002722  072034                          EFT111

    228
    229                             ;ERROR  113     BUS TIMEOUT-NED STATUS FAILURE
    230
        002724  066700                          EMT113
        002726  000000                          0
        002730  000000                          0
        002732  000000                          0

    231
    232                             ;ERROR  114     UNUSED
    233
        002734  000000                          0
        002736  000000                          0
        002740  000000                          0
        002742  000000                          0
```

```
                                ;ERROR  115     RMCS1 NOT INITIALIZED BY UNIBUS

002744  066716                          EMT115
002746  071600                          EHT1
002750  071724                          EDT1
002752  072014                          EFT1

                                ;ERROR  116     RMBA NOT INITIALIZED BY UNIBUS

002754  066726                          EMT116
002756  071600                          EHT1
002760  071724                          EDT1
002762  072014                          EFT1

                                ;ERROR  117     RMCS2 NOT INITIALIZED BY UNIBUS

002764  066736                          EMT117
002766  071600                          EHT1
002770  071724                          EDT1
002772  072014                          EFT1

                                ;ERROR  120     RMER1 NOT INITIALIZED BY UNIBUS

002774  066746                          EMT120
002776  071600                          EHT1
003000  071724                          EDT1
003002  072014                          EFT1

                                ;ERROR  121     RMAS NOT INITIALIZED BY UNIBUS

003004  066756                          EMT121
003006  071600                          EHT1
003010  071724                          EDT1
003012  072014                          EFT1

                                ;ERROR  122     RMMR1 NOT INITIALIZED BY UNIBUS

003014  066766                          EMT122
003016  071600                          EHT1
003020  071724                          EDT1
003022  072014                          EFT1

                                ;ERROR  123     RMDS NOT INITIALIZED BY UNIBUS

003024  066776                          EMT123
003026  071600                          EHT1
003030  071724                          EDT1
003032  072014                          EFT1
```

ERROR POINTER TABLE

```
255
256                                     ;ERROR  124     RMEC2 NOT INITIALIZED BY UNIBUS
257
003034  067006                                  EMT124
003036  071600                                  EHT1
003040  071724                                  EDT1
003042  072014                                  EFT1

258
259                                     ;ERROR  125     RMMR2 NOT INITIALIZED BY UNIBUS
260
003044  067016                                  EMT125
003046  071600                                  EHT1
003050  071724                                  EDT1
003052  072014                                  EFT1

261
262                                     ;ERROR  126     RMCS1 NOT CLEARED BY CONTROLLER CLEAR
263
003054  067026                                  EMT126
003056  071600                                  EHT1
003060  071724                                  EDT1
003062  072014                                  EFT1

264
265                                     ;ERROR  127     RMBA NOT CLEARED BY CONTROLLER CLEAR
266
003064  067040                                  EMT127
003066  071600                                  EHT1
003070  071724                                  EDT1
003072  072014                                  EFT1

267
268                                     ;ERROR  130     RMCS2 NOT CLEARED BY CONTROLLER CLEAR
269
003074  067052                                  EMT130
003076  071600                                  EHT1
003100  071724                                  EDT1
003102  072014                                  EFT1

270
271                                     ;ERROR  131     RMER1 NOT CLEARED BY CONTROLLER CLEAR
272
003104  067064                                  EMT131
003106  071600                                  EHT1
003110  071724                                  EDT1
003112  072014                                  EFT1

273
274                                     ;ERROR  132     RMAS NOT CLEARED BY CONTROLLER CLEAR
275
003114  067076                                  EMT132
003116  071600                                  EHT1
003120  071724                                  EDT1
003122  072014                                  EFT1

276
```

ERROR POINTER TABLE

```
277                                     ;ERROR  133     RMMR1 NOT CLEARED BY CONTROLLER CLEAR
278
     003124  067110                             EMT133
     003126  071600                             EHT1
     003130  071724                             EDT1
     003132  072014                             EFT1

279
280                                     ;ERROR  134     RMDS NOT CLEARED BY CONTROLLER CLEAR
281
     003134  067122                             EMT134
     003136  071600                             EHT1
     003140  071724                             EDT1
     003142  072014                             EFT1

282
283                                     ;ERROR  135     RMEC2 NOT CLEARED BY CONTROLLER CLEAR
284
     003144  067134                             EMT135
     003146  071600                             EHT1
     003150  071724                             EDT1
     003152  072014                             EFT1

285
286                                     ;ERROR  136     RMMR2 NOT CLEARED BY CONTROLLER CLEAR
287
     003154  067146                             EMT136
     003156  071600                             EHT1
     003160  071724                             EDT1
     003162  072014                             EFT1

288
289                                     ;ERROR  137     RMCS1 NOT CLEARED BY ERROR CLEAR
290
     003164  067160                             EMT137
     003166  071600                             EHT1
     003170  071724                             EDT1
     003172  072014                             EFT1

291
292                                     ;ERROR  140     RMCS2 NOT CLEARED BY ERROR CLEAR
293
     003174  067170                             EMT140
     003176  071600                             EHT1
     003200  071724                             EDT1
     003202  072014                             EFT1

294
295                                     ;ERROR  141     RMCS1 NOT CLEARED BY DRIVE CLEAR
296
     003204  067200                             EMT141
     003206  071600                             EHT1
     003210  071724                             EDT1
     003212  072014                             EFT1

297
298                                     ;ERROR  142     RMDS NOT CLEARED BY DRIVE CLEAR
```

ERROR POINTER TABLE

```
299
     003214  06 210                          EMT142
     003216  071600                          EHT1
     003220  071724                          EDT1
     003222  072014                          EFT1

300
301                                 ;ERROR  143     RMER1 NOT CLEARED BY DRIVE CLEAR
302
     003224  067220                          EMT143
     003226  071600                          EHT1
     003230  071724                          EDT1
     003232  072014                          EFT1

303
304                                 ;ERROR  144     RMAS NOT CLEARED BY DRIVE CLEAR
305
     003234  067230                          EMT144
     003236  071600                          EHT1
     003240  071724                          EDT1
     003242  072014                          EFT1

306
307                                 ;ERROR  145     RMMR1  NOT CLEARED BY DRIVE CLEAR
308
     003244  067240                          EMT145
     003246  071600                          EHT1
     003250  071724                          EDT1
     003252  072014                          EFT1

309
310                                 ;ERROR  146     RMMR2 NOT CLEARED BY DRIVE CLEAR
311
     003254  067250                          EMT146
     003256  071600                          EHT1
     003260  071724                          EDT1
     003262  072014                          EFT1

312
313                                 ;ERROR  147     RMER2 NOT CLEARED BY DRIVE CLEAR
314
     003264  067260                          EMT147
     003266  071600                          EHT1
     003270  071724                          EDT1
     003272  072014                          EFT1

315
316                                 ;ERROR  150     RMEC2 NOT CLEARED BY DRIVE CLEAR
317
     003274  067270                          EMT150
     003276  071600                          EHT1
     003300  071724                          EDT1
     003302  072014                          EFT1

318
319                                 ;ERROR  151     MEDIUM NOT ON LINE
320
```

ERROR POINTER TABLE

```
003304  067300                          EMT151
003306  071600                          EHT1
003310  071724                          EDT1
003312  072014                          EFT1

321
322                             ;ERROR  152     DRIVE FAULT
323
003314  067312                          EMT152
003316  071600                          EHT1
003320  071724                          EDT1
003322  072014                          EFT1

324
325                             ;ERROR  153     UNSAFE SHOULD BE SET BECAUSE DVC IS SET
326
003324  067324                          EMT153
003326  071600                          EHT1
003330  071724                          EDT1
003332  072014                          EFT1

327
328                             ;ERROR  154     UNSAFE SHOULD NOT BE SET, AC IS LOW
329
003334  067342                          EMT154
003336  071600                          EHT1
003340  071724                          EDT1
003342  072014                          EFT1

330
331                             ;ERROR  155     VOLUME VALID NOT SET BY PACK ACK
332
003344  067360                          EMT155
003346  071600                          EHT1
003350  071724                          EDT1
003352  072014                          EFT1

333
334                             ;ERROR  156     OFFSET MODE NOT SET BY OFFSET COMMAND
335
003354  067372                          EMT156
003356  071600                          EHT1
003360  071724                          EDT1
003362  072014                          EFT1

336
337                             ;ERROR  157     OFFSET MODE NOT RESET BY RTC COMMAND
338
003364  067404                          EMT157
003366  071600                          EHT1
003370  071724                          EDT1
003372  072014                          EFT1

339
340                             ;ERROR  160     RMOF NOT RESET BY RIP COMMAND
341
003374  067416                          EMT160
```

ERROR POINTER TABLE

```
003376  071600                          EHT1
003400  071724                          EDT1
003402  072014                          EFT1

342
343                             ;ERROR  161     RMDA NOT RESET BY RIP COMMAND
344
003404  067426                          EMT161
003406  071600                          EHT1
003410  071724                          EDT1
003412  072014                          EFT1

345
346                             ;ERROR  162     RMDC NOT RESET BY RIP COMMAND
347
003414  067440                          EMT162
003416  071600                          EHT1
003420  071724                          EDT1
003422  072014                          EFT1

348
349                             ;ERROR 163      DATA WAS ECC CORRECTED BUT DOES NOT COMPARE WITH
350                             ;               WRITE BUFFER
351
003424  071374                          EMT336
003426  071662                          EHT336
003430  071760                          EDT336
003432  072050                          EFT336

352
353                             ;ERROR  164     OPI SHOULD NOT BE SET
354
003434  067462                          EMT164
003436  071600                          EHT1
003440  071724                          EDT1
003442  072014                          EFT1

355
356                             ;ERROR  165     IVC SHOULD NOT BE SET
357
003444  067470                          EMT165
003446  071600                          EHT1
003450  071724                          EDT1
003452  072014                          EFT1

358
359                             ;ERROR  166     IAE SHOULD NOT BE SET
360
003454  067476                          EMT166
003456  071600                          EHT1
003460  071724                          EDT1
003462  072014                          EFT1

361
362                             ;ERROR  167     NEM SHOULD NOT BE SET
363
003464  067504                          EMT167
```

ERROR POINTER TABLE

```
003466  071600                          EHT1
003470  071724                          EDT1
003472  072014                          EFT1

364
365                             ;ERROR  170     INCORRECT 'MOL' STATUS DURING DIAGNOSTIC MODE
366
003474  067512                          EMT170
003476  071600                          EHT1
003500  071724                          EDT1
003502  072014                          EFT1

367
368                             ;ERROR  171     'ATA' NOT SET DURING RETURN TO CENTERLINE
369
003504  067524                          EMT171
003506  071600                          EHT1
003510  071724                          EDT1
003512  072014                          EFT1

370
371                             ;ERROR  172     'ATA' NOT SET BY OFFSET COMMAND
372
003514  067534                          EMT172
003516  071600                          EHT1
003520  071724                          EDT1
003522  072014                          EFT1

373
374                             ;ERROR  173     RMER2 NOT INITIALIZED BY UNIBUS INIT
375
003524  067544                          EMT173
003526  071600                          EHT1
003530  071724                          EDT1
003532  072014                          EFT1

376
377                             ;ERROR  174     RMER2 NOT INITIALIZED BY CONTROLLER CLEAR
378
003534  067554                          EMT174
003536  071600                          EHT1
003540  071724                          EDT1
003542  072014                          EFT1

379
380                             ;ERROR  175     SELECTED DEVICE IS IN WRITE PROTECT
381
003544  067566                          EMT175
003546  071600                          EHT1
003550  071724                          EDT1
003552  072014                          EFT1

382
383                             ;ERROR  176     CANNOT SET DIAGNOSTIC MODE
384
003554  067574                          EMT176
003556  071600                          EHT1
```

ERROR POINTER TABLE

```
003560  071724                          EDT1
003562  072014                          EFT1

385
386                             ;ERROR  177     --RESERVED FOR POWER MONITOR BIT FAILURE--
387
003564  000000                          0
003566  000000                          0
003570  000000                          0
003572  000000                          0

388
389                             ;ERROR  200     INCORRECT 'PIP' STATUS DURING DIAGNOSTIC MODE
390
003574  067604                          EMT200
003576  071600                          EHT1
003600  071724                          EDT1
003602  072014                          EFT1

391
392                             ;ERROR  201     INCORRECT 'WRL' STATUS DURING DIAGNOSTIC MODE
393
003604  067616                          EMT201
003606  071600                          EHT1
003610  071724                          EDT1
003612  072014                          EFT1

394
395                             ;ERROR  202     INCORRECT 'SKI' STATUS DURING DIAGNOSTIC MODE
396
003614  067630                          EMT202
003616  071600                          EHT1
003620  071724                          EDT1
003622  072014                          EFT1

397
398                             ;ERROR  203     INCORRECT 'DVC' STATUS DURING DIAGNOSTIC MODE
399
003624  067642                          EMT203
003626  071600                          EHT1
003630  071724                          EDT1
003632  072014                          EFT1

400
401                             ;ERROR  204     'VV' WAS NOT RESET BY MAINTENANCE UNIT READY
402
003634  067654                          EMT204
003636  071600                          EHT1
003640  071724                          EDT1
003642  072014                          EFT1

403
404                             ;ERROR  205     SELECTED DEVICE HAS A PERSISTENT 'SKI' ERROR
405
003644  067672                          EMT205
003646  071600                          EHT1
003650  071724                          EDT1
```

ERROR POINTER TABLE

```
        003652  072014                          EFT1

    406
    407                             ;ERROR  206     "LBC" DID NOT SET DURING DIAGNOSTIC MODE
    408
        003654  067702                          EMT206
        003656  071600                          EHT1
        003660  071724                          EDT1
        003662  072014                          EFT1

    409
    410                             ;ERROR  207     UNEXPECTED LOSS OF "MOL" - MEDIUM IS OFF LINE
    411
        003664  067712                          EMT207
        003666  071600                          EHT1
        003670  071724                          EDT1
        003672  072014                          EFT1

    412
    413                             ;ERROR  210     UNEXPECTED LOSS OF VOLUME VALID - "VV" = 0
    414
        003674  067724                          EMT210
        003676  071600                          EHT1
        003700  071724                          EDT1
        003702  072014                          EFT1

    415
    416                             ;ERROR  211     UNEXPECTED MECHANICAL MOTION - "PIP" = 1
    417
        003704  067732                          EMT211
        003706  071600                          EHT1
        003710  071724                          EDT1
        003712  072014                          EFT1

    418
    419                             ;ERROR  212     UNEXPECTED DEVICE FAULT - "DVC" = 1
    420
        003714  067746                          EMT212
        003716  071600                          EHT1
        003720  071724                          EDT1
        003722  072014                          EFT1

    421
    422                             ;ERROR  213     UNEXPECTED SEEK INCOMPLETE ERROR - "SKI" = 1
    423
        003724  067762                          EMT213
        003726  071600                          EHT1
        003730  071724                          EDT1
        003732  072014                          EFT1

    424
    425                             ;ERROR  214     DRIVE EXECUTED A RECALIBRATE WITH ERROR SET
    426
        003734  067772                          EMT214
        003736  071612                          EHT2
        003740  071734                          EDT2
        003742  072024                          EFT2
```

```
                                ;ERROR  215     DRIVE DID NOT DETECT "IVC" ERROR DURING RECALIBRATE
003744  070012                          EMT215
003746  071612                          EHT2
003750  071734                          EDT2
003752  072024                          EFT2

                                ;ERROR  216     INCORRECT "IVC" STATUS
003754  070024                          EMT216
003756  071600                          EHT1
003760  071724                          EDT1
003762  072014                          EFT1

                                ;ERROR  217     INCORRECT "IAE" STATUS
003764  070034                          EMT217
003766  071600                          EHT1
003770  071724                          EDT1
003772  072014                          EFT1

                                ;ERROR 220      INCORRECT "WLE" STATUS
003774  070044                          EMT220
003776  071600                          EHT1
004000  071724                          EDT1
004002  072014                          EFT1

                                ;ERROR  221     INCORRECT "OPI" STATUS
004004  070054                          EMT221
004006  071600                          EHT1
004010  071724                          EDT1
004012  072014                          EFT1

                                ;ERROR  222     RM80 DID NOT DETECT RMR ERROR
004014  070064                          EMT222
004016  071600                          EHT1
004020  071724                          EDT1
004022  072014                          EFT1

                                ;ERROR  223     RM80 DID NOT DETECT PARITY ERROR ON MASSBUS CONTROL BUS
004024  070074                          EMT223
004026  071636                          EHT223
004030  071750                          EDT223
004032  072040                          EFT223
```

```
448
449                                     ;ERROR  224     SSE NOT DETECTED DURING DATA TRANSFER
450
004034  070104                                  EMT224
004036  071600                                  EHT1
004040  071724                                  EDT1
004042  072014                                  EFT1

451
452                                     ;ERROR  225     "SSEI" NOT RESET BY END OF TRACK DURING DATA TRANSFER
453
004044  070120                                  EMT225
004046  071600                                  EHT1
004050  071724                                  EDT1
004052  072014                                  EFT1

454
455                                     ;ERROR  226     "SSEI" SHOULD BE SET AFTER DATA TRANSFER
456
004054  070140                                  EMT226
004056  071600                                  EHT1
004060  071724                                  EDT1
004062  072014                                  EFT1

457
458                                     ;ERROR  227     SSE WAS DETECTED W/ SSEI SET
459
004064  070150                                  EMT227
004066  071600                                  EHT1
004070  071724                                  EDT1
004072  072014                                  EFT1

460
461                                     ;ERROR  230     UNUSED
462
004074  070164                                  EMT230
004076  000000                                  0
004100  000000                                  0
004102  000000                                  0

463
464                                     ;ERROR  231     UNUSED
465
004104  070166                                  EMT231
004106  000000                                  0
004110  000000                                  0
004112  000000                                  0

466
467                                     ;ERROR  232     UNUSED
468
004114  070170                                  EMT232
004116  000000                                  0
004120  000000                                  0
004122  000000                                  0

469
```

ERROR POINTER TABLE

```
    470                                 ;ERROR  233     UNUSED
    471
        004124  070172                          EMT233
        004126  000000                          0
        004130  000000                          0
        004132  000000                          0

    472
    473                                 ;ERROR  234     UNUSED
    474
        004134  000000                          0
        004136  000000                          0
        004140  000000                          0
        004142  000000                          0

    475
    476                                 ;ERROR  235     UNUSED
    477
        004144  000000                          0
        004146  000000                          0
        004150  000000                          0
        004152  000000                          0

    478
    479                                 ;ERROR  236     UNUSED
    480
        004154  000000                          0
        004156  000000                          0
        004160  000000                          0
        004162  000000                          0

    481
    482                                 ;ERROR  237     UNUSED
    483
        004164  000000                          0
        004166  000000                          0
        004170  000000                          0
        004172  000000                          0

    484
    485                                 ;ERROR  240     UNUSED
    486
        004174  000000                          0
        004176  000000                          0
        004200  000000                          0
        004202  000000                          0

    487
    488                                 ;ERROR  241     UNUSED
    489
        004204  000000                          0
        004206  000000                          0
        004210  000000                          0
        004212  000000                          0

    490
    491                                 ;ERROR  242     UNUSED
```

ERROR POINTER TABLE

```
492
     004214  000000                          0
     004216  000000                          0
     004220  000000                          0
     004222  000000                          0

493
494                                ;ERROR  243     UNUSED
495
     004224  000000                          0
     004226  000000                          0
     004230  000000                          0
     004232  000000                          0

496
497                                ;ERROR  244     UNUSED
498
     004234  000000                          0
     004236  000000                          0
     004240  000000                          0
     004242  000000                          0

499
500                                ;ERROR  245     UNUSED
501
     004244  000000                          0
     004246  000000                          0
     004250  000000                          0
     004252  000000                          0

502
503                                ;ERROR  246     "ATA" NOT RESET BY GO WHEN "ERR" = 0
504
     004254  070220                          EMT246
     004256  071600                          EHT1
     004260  071724                          EDT1
     004262  072014                          EFT1

505
506                                ;ERROR  247     "ATA" NOT RESET BY WRITING RMAS
507
     004264  070230                          EMT247
     004266  071600                          EHT1
     004270  071724                          EDT1
     004272  072014                          EFT1

508
509                                ;ERROR  250     "ATA" WAS RESET BY GO WHEN "ERR" = 1
510
     004274  070242                          EMT250
     004276  071600                          EHT1
     004300  071724                          EDT1
     004302  072014                          EFT1

511
512                                ;ERROR  251     PROGRAM INTERRUPT WAS NOT GENERATED
513
```

ERROR POINTER TABLE

```
004304  070256                          EMT251
004306  071612                          EHT2
004310  071734                          EDT2
004312  072024                          EFT2

514
515                             ;ERROR  252     PROGRAM INTERRUPT SHOULD NOT HAVE BEEN GENERATED
516
004314  070264                          EMT252
004316  071612                          EHT2
004320  071734                          EDT2
004322  072024                          EFT2

517
518                             ;ERROR  253     OFFSET MODE WAS NOT RESET BY WRITING RMDC
519
004324  070272                          EMT253
004326  071600                          EHT1
004330  071724                          EDT1
004332  072014                          EFT1

520
521                             ;ERROR  254     INCORRECT "ILF" STATUS
522
004334  070310                          EMT254
004336  071600                          EHT1
004340  071724                          EDT1
004342  072014                          EFT1

523
524                             ;ERROR  255     INCORRECT "ATA" STATUS
525
004344  070320                          EMT255
004346  071600                          EHT1
004350  071724                          EDT1
004352  072014                          EFT1

526
527                             ;ERROR  256     INCORRECT "ILR" STATUS
528
004354  070330                          EMT256
004356  071650                          EHT256
004360  071750                          EDT223
004362  072040                          EFT223

529
530                             ;ERROR  257     INVALID IAE STATUS DURING SEARCH COMMAND
531
004364  070340                          EMT257
004366  071600                          EHT1
004370  071724                          EDT1
004372  072014                          EFT1

532
533                             ;ERROR  260     "IVC" WAS NOT DETECTED DURING SEARCH COMMAND
534
004374  070352                          EMT260
```

```
ERROR POINTER TABLE

004376  071600                          EHT1
004400  071724                          EDT1
004402  072014                          EFT1

535
536                             ;ERROR  261     DRIVE EXECUTED SEARCH WITH ERROR SET
537
004404  070364                          EMT261
004406  071600                          EHT1
004410  071724                          EDT1
004412  072014                          EFT1

538
539                             ;ERROR  262     "LBC" ERROR NOT SET DURING DIAGNOSTIC MODE
540
004414  070404                          EMT262
004416  071600                          EHT1
004420  071724                          EDT1
004422  072014                          EFT1

541
542                             ;ERRuR  263     "SKI" ERROR DURING SEARCH COMMAND
543
004424  070414                          EMT263
004426  071600                          EHT1
004430  071724                          EDT1
004432  072014                          EFT1

544
545                             ;ERROR  26'     "IVC" ERROP DURING SEARCH - LOST VOLUME VALID
546
004434  070424                          EMT264
004436  071600                          EHT1
004440  071724                          EDT1
004442  072014                          EFT1

547
548                             ;ERROR  265     ERRONEOUS IVC ERROR DURING SEARCH - VOLUME IS VALID
549
004444  070444                          EMT265
004446  071600                          EHT1
004450  071724                          EDT1
004452  072014                          EFT1

550
551                             ;ERROR  266     DEVICE FAULT (DVC) DURING SEARCH
552
004454  070464                          EMT266
004456  071600                          EHT1
004460  071724                          EDT1
004462  072014                          EFT1

553
554                             ;ERROR  267     SKI SHOULD HAVE BEEN SET BECAUSE CYLINDER
555                             ;               ADDRESS IS TOO LARGE
556
004464  070476                          EMT267
```

ERROR POINTER TABLE

```
        004466  071600                          EHT1
        004470  071724                          EDT1
        004472  072014                          EFT1

    557
    558                             ;ERROR  270     OPI ERROR DURING SEARCH BECAUSE MOL = 0
    559
        004474  070514                          EMT270
        004476  071600                          EHT1
        004500  071724                          EDT1
        004502  072014                          EFT1

    560
    561                             ;ERROR  271     OPI ERROR DURING SEARCH BECAUSE ON CYLINDER
    562                             ;               DIDN'T DROP
    563
        004504  070530                          EMT271
        004506  071600                          EHT1
        004510  071724                          EDT1
        004512  072014                          EFT1

    564
    565                             ;ERROR  272     LOST MOL DURING SEARCH, OPI IS NOT SET
    566
        004514  070546                          EMT272
        004516  071600                          EHT1
        004520  071724                          EDT1
        004522  072014                          EFT1

    567
    568                             ;ERROR  273     PIP STIL SET AFTER SEARCH
    569
        004524  070564                          EMT273
        004526  071600                          EHT1
        004530  071724                          EDT1
        004532  072014                          EFT1

    570
    571                             ;ERROR  274     PARITY ERROR OCCURRED WHILE WRITING REMOTE
    572                             ;               REGISTERS BUT MXF DID NOT SET
    573
        004534  070602                          EMT274
        004536  071600                          EHT1
        004540  071724                          EDT1
        004542  072014                          EFT1

    574
    575                             ;ERROR  275     MXF ERROR - COMPOSITE ERROR OCCURRED BEFORE DATA
    576                             ;               COMMAND STARTED
    577
        004544  070620                          EMT275
        004546  071600                          EHT1
        004550  071724                          EDT1
        004552  072014                          EFT1

    578
    579                             ;ERROR  276     "OPI" ERROR DURING DATA TRANSFER BECAUSE "MOL" WAS
```

ERROR POINTER TABLE

```
                                ;               ZERO
004554  070632                          EMT276
004556  071600                          EHT1
004560  071724                          EDT1
004562  072014                          EFT1

                                ;ERROR  277     "OPI" ERROR DURING DATA TRANSFER BECAUSE 1) ON
                                ;               CYLINDER DIDN'T DROP OR 2) SEARCH TIMED OUT OR
                                ;               3) RUN TIMED OUT
004564  070646                          EMT277
004566  071600                          EHT1
004570  071724                          EDT1
004572  072014                          EFT1

                                ;ERROR  300     "IVC" ERROR DURING DATA TRANSFER BECAUSE VOLUME
                                ;               WAS NOT VALID
004574  070664                          EMT300
004576  071600                          EHT1
004600  071724                          EDT1
004602  072014                          EFT1

                                ;ERROR  301     ERRONEOUS "IVC" ERROR DURING DATA TRANSFER - VOLUME
                                ;               IS VALID
004604  070704                          EMT301
004606  071600                          EHT1
004610  071724                          EDT1
004612  072014                          EFT1

                                ;ERROR  302     "ILR" ERROR DURING DATA TRANSFER
004614  070726                          EMT302
004616  071600                          EHT1
004620  071724                          EDT1
004622  072014                          EFT1

                                ;ERROR  303     "ILF" ERROR DURING DATA TRANSFER
004624  070740                          EMT303
004626  071600                          EHT1
004630  071724                          EDT1
004632  072014                          EFT1

                                ;ERROR  304     "RMR" ERROR DURING DATA TRANSFER
004634  070752                          EMT304
004636  071600                          EHT1
004640  071724                          EDT1
```

ERROR POINTER TABLE

```
004642  072014                          EFT1

604
605                             ;ERROR  305     INCORRECT "IAE" STATUS DURING DATA TRANSFER
606
004644  070764                          EMT305
004646  071600                          EHT1
004650  071724                          EDT1
004652  072014                          EFT1

607
608                             ;ERROR  306     "SKI" ERROR DURING DATA TRANSFER
609
004654  070776                          EMT306
004656  071600                          EHT1
004660  071724                          EDT1
004662  072014                          EFT1

610
611                             ;ERROR  307     DRIVE DID NOT DETECT SKI ERROR DUE TO CYLINDER
612
004664  071006                          EMT307
004666  071600                          EHT1
004670  071724                          EDT1
004672  072014                          EFT1

613
614                             ;ERROR  310     DEVICE FAULT DURING DATA TRANSFER
615
004674  071026                          EMT310
004676  071600                          EHT1
004700  071724                          EDT1
004702  072014                          EFT1

616
617                             ;ERROR  311     LOSS OF BIT CLOCK DURING DATA TRANSFER
618
004704  071040                          EMT311
004706  071600                          EHT1
004710  071724                          EDT1
004712  072014                          EFT1

619
620                             ;ERROR  312     LOSS OF SYSTEM CLOCK DURING DATA TRANSFER
621
004714  071052                          EMT312
004716  071600                          EHT1
004720  071724                          EDT1
004722  072014                          EFT1

622
623                             ;ERROR  313     UNSAFE ERROR DURING DATA TRANSFER (DVC = 0)
624
004724  071064                          EMT313
004726  071600                          EHT1
004730  071724                          EDT1
004732  072014                          EFT1
```

ERROR POINTER TABLE

```
                                ;ERROR  314     DRIVE TIMING ERROR DURING DATA TRANSFER
004734  071104                          EMT314
004736  071600                          EHT1
004740  071724                          EDT1
004742  072014                          EFT1

                                ;ERROR  315     WRITE LOCK ERROR
004744  071116                          EMT315
004746  071600                          EHT1
004750  071724                          EDT1
004752  072014                          EFT1

                                ;ERROR  316     ERRONEOUS WRITE LOCK ERROR
004754  071130                          EMT316
004756  071600                          EHT1
004760  071724                          EDT1
004762  072014                          EFT1

                                ;ERROR  317     HEADER CRC ERROR DURING DATA TRANSFER
004764  071142                          EMT317
004766  071600                          EHT1
004770  071724                          EDT1
004772  072014                          EFT1

                                ;ERROR  320     FORMAT ERROR DURING DATA TRANSFER
004774  071152                          EMT320
004776  071600                          EHT1
005000  071724                          EDT1
005002  072014                          EFT1

                                ;ERROR  321     HEADER COMPARE ERROR DURING DATA TRANSFER
005004  071162                          EMT321
005006  071600                          EHT1
005010  071724                          EDT1
005012  072014                          EFT1

                                ;ERROR  322     HEADER ERRORS SHOULD NOT BE SET
005014  071172                          EMT322
005016  071600                          EHT1
005020  071724                          EDT1
005022  072014                          EFT1
```

ERROR POINTER TABLE

```
646
647                                     ;ERROR  323     DATA CHECK ERROR DURING DATA TRANSFER
648
    005024  071200                              EMT323
    005026  071600                              EHT1
    005030  071724                              EDT1
    005032  072014                              EFT1

649
650                                     ;ERROR  324     CORRECTABLE DATA CHECK ERROR DURING DATA TRANSFER
651
    005034  071210                              EMT324
    005036  071600                              EHT1
    005040  071724                              EDT1
    005042  072014                              EFT1

652
653                                     ;ERROR  325     UNCORRECTABLE DATA CHECK ERROR DURING DATA TRANSFER
654
    005044  071222                              EMT325
    005046  071600                              EHT1
    005050  071724                              EDT1
    005052  072014                              EFT1

655
656                                     ;ERROR  326     DATA PARITY ERROR DURING READ COMMMAND
657
    005054  071234                              EMT326
    005056  071600                              EHT1
    005060  071724                              EDT1
    005062  072014                              EFT1

658
659                                     ;ERROR  327     OFFSET MODE NOT RESET BY WRITE COMMAND
660
    005064  071252                              EMT327
    005066  071600                              EHT1
    005070  071724                              EDT1
    005072  072014                              EFT1

661
662                                     ;ERROR  330     DATA PARITY ERROR DURING WRITE COMMAND
663
    005074  071264                              EMT330
    005076  071600                              EHT1
    005100  071724                              EDT1
    005102  072014                              EFT1

664
665                                     ;ERROR  331     WRITE CLOCK FALURE DURING WRITE COMMAND
666
    005104  071274                              EMT331
    005106  071600                              EHT1
    005110  071724                              EDT1
    005112  072014                              EFT1

667
```

ERROR POINTER TABLE

```
668                                     ;ERROR  332     DATA LATE ERROR DURING DATA TRANSFER
669
     005114  071306                               EMT332
     005116  071600                               EHT1
     005120  071724                               EDT1
     005122  072014                               EFT1

670
671                                     ;ERROR  333     PIP STIL SET AFTER DATA TRANSFER - SKI = 0
672
     005124  071320                               EMT333
     005126  071600                               EHT1
     005130  071724                               EDT1
     005132  072014                               EFT1

673
674                                     ;ERROR  334     LOST MOL DURING DATA TRANSFER - OPI = 0
675
     005134  071336                               EMT334
     005136  071600                               EHT1
     005140  071724                               EDT1
     005142  072014                               EFT1

676
677                                     ;ERROR  335     LOST VOLUME VALID DURING DATA TRANSFER - IVC  = 0
678
     005144  071354                               EMT335
     005146  071600                               EHT1
     005150  071724                               EDT1
     005152  072014                               EFT1

679
680                                     ;ERROR  336     DATA READ DOES NOT COMPARE WITH DATA WRITTEN
681
     005154  071374                               EMT336
     005156  071662                               EHT336
     005160  071760                               EDT336
     005162  072050                               EFT336

682
683                                     ;ERROR  337     WRITE CHECK ERROR NOT DETECTED
684
     005164  071404                               EMT337
     005166  071674                               EHT337
     005170  071770                               EDT337
     005172  072060                               EFT337

685
686                                     ;ERROR  340     WRITE CHECK ERROR AT UNEXPECTED ADDRESS
687
     005174  071414                               EMT340
     005176  071662                               EHT336
     005200  071760                               EDT336
     005202  072050                               EFT336

688
689                                     ;ERROR  341     INCORRECT DATA DURING WRITE CHECK ERROR
```

ERROR POINTER TABLE

```
690
     005204  071426                          EMT341
     005206  071662                          EHT336
     005210  071760                          EDT336
     005212  072050                          EFT336

691
692                                 ;ERROR  342     "IVC" ERROR NOT DETECTED DURING DATA TRANSFER
693
     005214  071434                          EMT342
     005216  071600                          EHT1
     005220  071724                          EDT1
     005222  072014                          EFT1

694
695                                 ;ERROR  343     "FER" NOT DETECTED DURING DATA TRANSFER
696
     005224  071446                          EMT343
     005226  071600                          EHT1
     005230  071724                          EDT1
     005232  072014                          EFT1

697
698                                 ;ERROR  344     "HCE" NOT DETECTED DURING DATA TRANSFER
699
     005234  071460                          EMT344
     005236  071706                          EHT344
     005240  072000                          EDT344
     005242  072070                          EFT344

700
701                                 ;ERROR  345     "BSE" NOT DETECTED DURING DATA TRANSFER
702
     005244  071472                          EMT345
     005246  071600                          EHT1
     005250  071724                          EDT1
     005252  072014                          EFT1

703
704                                 ;ERROR  346     HEADER ERROR WAS DETECTED W/ HCI SET
705
     005254  071502                          EMT346
     005256  071600                          EHT1
     005260  071724                          EDT1
     005262  072014                          EFT1

706
707                                 ;ERROR  347     DATA TRANSFER NOT ABORTED W/ COMP ERROR SET
708
     005264  071516                          EMT347
     005266  071600                          EHT1
     005270  071724                          EDT1
     005272  072014                          EFT1

709
710                                 ;ERROR  350     LOST VOLUME VALID DURING SEARCH - "IVC" = 0
711
```

ERROR POINTER TABLE

```
005274  071530                          EMT350
005276  071600                          EHT1
005300  071724                          EDT1
005302  07201'                          EFT1

712
713                             ;ERROR  351     "ATA" DID NOT SET DURING SEARCH
714
005304  071546                          EMT351
005306  071600                          EHT1
005310  071724                          EDT1
005312  072014                          EFT1

715
716                             ;ERROR  352     PROGRAM TIMEOUT WHILE TESTING RMLA
717
005314  071556                          EMT352
005316  000000                          0
005320  000000                          0
005322  000000                          0

718
719                             ;ERROR  353     LOOK AHEAD TEST FAILS
720
005324  071562                          EMT353
005326  071720                          EHT353
005330  072012                          EDT353
005332  072100                          EFT353

721
722                             ;ERROR  354     BSE SHOULD NOT BE SET
723
005334  071572                          EMT354
005336  071600                          EHT1
005340  071724                          EDT1
005342  072014                          EFT1

724
725                             ;PUT ERROR TABLE HERE
```

```
                        .SBTTL  ERROR TABLE USAGE

                        ;THE ERROR TABLE ABOVE CONSISTS OF FOUR WORD ENTRIES FOR EACH ERROR
                        ;NUMBER, I.E.,
                        ;
                        ;       EMT - ERROR MESSAGE TABLE ADDRESS
                        ;       EHT - ERROR HEADER TABLE ADDRESS
                        ;       EDT - ERROR DATA TABLE ADDRESS
                        ;       EFT - ERROR FORMAT TABLE ADDRESS
                        ;
                        ;THE EMT ENTRY IS THE ADDRESS OF THE TABLE OF ERROR MESSAGE STRINGS
                        ;FOR THE PARTICULAR ERROR.  EACH ERROR MESSAGE TABLE LISTS THE ADDRESS
                        ;OF ONE OR MORE ERROR MESSAGE STRINGS WHICH ARE TO BE FORMATTED AND
                        ;TYPED BY THE ERROR TYPE SUBROUTINE.  IF THE EMT ENTRY IS ZERO, THERE IS
                        ;NO MESSAGE TO BE TYPED FOR THE ERROR.
                        ;
                        ;SIMILARLY, THE EHT, EDT, AND EFT ENTRIES ARE ADDRESSES OF TABLES
                        ;OF HEADER, DATA AND FORMAT INFORMATION FOR A GIVEN ERROR.  EACH ENTRY
                        ;IN THE ERROR HEADER TABLE MAY OR MAY NOT HAVE AN ASSOCIATED LINE OF
                        ;DATA, HOWEVER, EACH DATA LINE MUST HAVE AN ASSOCIATED FORMAT AND
                        ;HEADER. THAT IS, A HEADER LINE MAY BE PRINTED WITHOUT ANY DATA,
                        ;BUT A DATA LINE IS NOT PRINTED WITHOUT A HEADER, AND EACH DATA LINE
                        ;MUST ALSO HAVE A FORMAT.
                        ;
                        ;IN SUMMARY,
                        ;       EACH NONZERO ENTRY IS THE ADDRESS OF A TABLE,
                        ;       EACH TABLE IS A LIST OF ADDRESSES WHICH DEFINES THE LOCATIONS
                        ;       OF MESSAGE STRINGS, HEADERS, DATA OR FORMAT.
```

ERROR TABLE USAGE

```
                                        ;THIS ROUTINE HANDLES UNEXPECTED TIMEOUTS

005344  011600          BADTMO: MOV     (SP),R0         ;SAVE PC WHERE THE TIME OUT OCCURED
005346  005700                  TST     -(R0)           ;ADJUST PC -2
005350  022626                  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
005352  104401  005360          TYPE    ,65$            ;;TYPE ASCIZ STRING
005356  000417                  BR      64$             ;;GET OVER THE ASCIZ
                        ;;65$:  .ASCIZ  <CRLF>/UNEXPECTED BUS TIMEOUT, PC=/
005416                  64$:
005416  010046                  MOV     R0,-(SP)        ;SETUP FOR TYPING OUT PC
005420  104402                  TYPOC
005422  000240                  NOP                     ;PUT 'HALT(0)' INSTRUCTION HERE IF YOU WISH
                                                        ;TO STOP ON UNEXPECTED TIMEOUT.


                        .SBTTL  START OF PROGRAM

005424  012737  177777  001330  START1: MOV     #-1,CHGADR      ;CHANGE RH/RM BUS ADDRESS
005432  000402                  BR      START2

005434  005037  001330  START:  CLR     CHGADR          ;NO CHANGE IN ADDRESS
005440  000240          START2: NOP
005442  005227  000000          INC     #0              ;TTY LOOP, WAIT FOR INCREMENT
005446  001375                  BNE     .-4             ;OF WORD
005450  000005                  RESET                   ;RESET THE WORLD


                        .SBTTL  INITIALIZE THE COMMON TAGS
                        ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
005452  012706  001114          MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
005456  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
005460  022706  001154          CMP     #SWR,R6         ;;DONE?
005464  001374                  BNE     .-6             ;;LOOP BACK IF NO
005466  012706  001100          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                        ;;INITIALIZE A FEW VECTORS
005472  012737  057114  000020  MOV     #$SCOPE,a#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
005500  012737  000340  000022  MOV     #340,a#IOTVEC+2 ;;LEVEL 7
005506  012737  057710  000030  MOV     #$ERROR,a#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
005514  012737  000340  000032  MOV     #340,a#EMTVEC+2 ;;LEVEL 7
005522  012737  062714  000034  MOV     #$TRAP,a#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
005530  012737  000340  000036  MOV     #340,a#TRAPVEC+2;LEVEL 7
005536  012737  063022  000024  MOV     #$PWRDN,a#PWRVEC ;;POWER FAILURE VECTOR
005544  012737  000340  000026  MOV     #340,a#PWRVEC+2 ;;LEVEL 7
005552  013737  031240  031232  MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
005560  005037  001206          CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
005564  005037  001210          CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
005570  112737  000001  001131  MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
005576  012737  005576  001122  MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
005604  012737  005604  001124  MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                        ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                        ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
005612  013746  000004          MOV     a#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
005616  012737  005652  000004  MOV     #64$,a#ERRVEC   ;;SET UP ERROR VECTOR
005624  012737  177570  001154  MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
005632  012737  177570  001156  MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
005640  022777  177777  173306  CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
005646  001012                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                        ;;AND  THE HARDWARE SWR IS NOT = -1
005650  000403                  BR      65$             ;;BRANCH IF NO TIMEOUT
```

```
INITIALIZE THE COMMON TAGS

005652  012716  005660          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
005656  000002                          RTI
005660  012737  000176  001154  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
005666  012737  000174  001156          MOV     #DISPREG,DISPLAY
005674  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

005700  005037  001230                  CLR     $PASS           ;;CLEAR PASS COUNT
005704  132737  000200  001243          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
005712  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
005714  012737  001244  001154          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
005722                          67$:
;SETUP "TIMEOUT" TRAP VECTOR FOR UNEXPECTED BUS TIMEOUTS
005722  012737  005344  000004          MOV     #BADTMO,ERRVEC  ;SETUP FOR UNEXPECTED TIMEOUT
005730  012737  000300  000006          MOV     #PR6,ERRVEC+2   ;LEVEL 6

                        .SBTTL  TYPE PROGRAM NAME
                        ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
005736  005227  177777          INC     #-1             ;;FIRST TIME?
005742  001033                  BNE     68$             ;;BRANCH IF NO
005744  022737  031402  000042  CMP     #$ENDAD,@#42    ;;ACT-11?
005752  001427                  BEQ     68$             ;;BRANCH IF YES
005754  104401  005762          TYPE    ,69$            ;;TYPE ASCIZ STRING
005760  000424                  BR      68$             ;;GET OVER THE ASCIZ
                        ;;69$:  .ASCIZ  <CRLF>@CZRNEA0 - RM80 FUNCTIONAL TEST, PT 2@<CRLF>
006032                  68$:
                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
006032  005737  000042          TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
006036  001012                  BNE     70$             ;;BRANCH IF YES
006040  123727  001242  000001  CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
006046  001406                  BEQ     70$             ;;BRANCH IF YES
006050  023727  001154  000176  CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
006056  001005                  BNE     71$             ;;BRANCH IF NO
006060  104407                  GTSWR                   ;;GET SOFT-SWR SETTINGS
006062  000403                  BR      71$
006064  112737  000001  001150  70$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
006072                  71$:

;THE FOLLOWING FINDS OUT THE PROGRAM CONTROL MODE:
;PAPER TAPE (MANUAL), ACT11, XXDP CHAIN OR DUMP

006072  005037  001332          CLR     XXDP            ;CLEAR 'XXDP' LOAD DEVICE STORAGE
006076  122737  000016  000041  CMPB    #16,@#41        ;LOADED FROM AN RM80 ?
006104  001121                  BNE     3$              ;BR IF NOT
006106  013737  000040  001332  MOV     @#40,XXDP       ;GET DEVICE INDICATOR AND NUMBER
006114  122737  000007  001332  CMPB    #7,XXDP         ;IS IT A VALID NUMBER ?
006122  103002                  BHIS    1$              ;YES
006124  105037  001332          CLRB    XXDP            ;NO, DEFAULT TO DRIVE 0
006130  005737  000042  1$:     TST     @#42            ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
006134  001425                  BEQ     2$              ;BR IF NEITHER
006136  104401  006144          TYPE    ,73$            ;;TYPE ASCIZ STRING
006142  000412                  BR      72$             ;;GET OVER THE ASCIZ
                        ;;73$:  .ASCIZ  <CRLF>/NOT TESTING DRIVE /
006170                  72$:
006170  005046                  CLR     -(SP)           ;CLEAR WORD ON STACK
006172  113716  001332          MOVB    XXDP,(SP)       ;GET DRIVE ADDRESS
006176  104403                  TYPOS                   ;TYPE THE ADDRESS
006200     001                  .BYTE   1               ;ONLY 1 CHARACTER
```

```
     006201     000                          .BYTE   0               ;SUPRESS LEADING ZEROS
     006202  104401  001217                  TYPE    ,$CRLF          ;CR-LF
     006206  000460                         BR      3$              ;GET NUMBER OF DRIVES

     006210  005227  177777          2$:     INC     #-1             ;FIRST TIME THRU HERE ?
     006214  001055                         BNE     3$              ;NO
     006216  104401  006224                  TYPE    ,75$            ;;TYPE ASCIZ STRING
     006222  000410                         BR      74$             ;;GET OVER THE ASCIZ
                                    ;;75$:   .ASCIZ  <CRLF>/TO TEST DRIVE /
     006244                         74$:
     006244  005046                         CLR     -(SP)           ;CLEAR WORD ON STACK
     006246  113716  001332                  MOVB    XXDP,(SP)       ;GET DRIVE ADDRESS
     006252  104403                         TYPOS                   ;TYPE DRIVE ADDRESS
     006254     001                         .BYTE   1               ;ONLY 1 CHARACTER
     006255     000                         .BYTE   0               ;SUPRESS LEADING ZEROS
     006256  104401  006264                  TYPE    ,76$            ;;TYPE ASCIZ STRING
     006262  000432                         BR      3$              ;;GET OVER THE ASCIZ
                                    ;;76$:   .ASCIZ  /, HALT PROGRAM, CLEAR LOC. 40 AND RESTART PROGRAM./<CRLF>
     006350                         3$:
63
64
                                    ;CHECK FOR AUTO MODE OR STANDALONE MODE
     006350  005737  000042                  TST     @#42            ;RUNNING IN AUTO MODE ?
     006354  001537                         BEQ     STANDALONE      ;BR IF NO
     006356  012737  000377  001300          MOV     #377,$DEVM      ;SET DEVICE MAP FOR ALL DRIVES
68
69                                  ;PROGRAM IS RUNNING IN AUTO MODE - SEE IF SIZING IS ALLOWED
     006364                         XSIZ:
     006364  132737  000200  001243          BITB    #BIT7,$ENVM     ;SIZING ALLOWED ?
     006372  001124                         BNE     12$             ;NO
73
     006374  005001                         CLR     R1              ;START FROM DRIVE 0
     006376  013700  001276                  MOV     $BASE,R0        ;LOAD THE BASE ADDRESS
     006402  104401  064504                  TYPE    ,SYSTAT         ;TYPE 'UNIT STATUS:'
77
     006406  136137  065004  001300  1$:     BITB    ATNTBL(R1),$DEVM        ;IS DEVICE PRESENT IN MAP ?
     006414  001507                         BEQ     11$             ;BR IF NO
     006416  104401  001217                  TYPE    ,$CRLF          ;CR-LF
     006422  010146                         MOV     R1,-(SP)        ;;SAVE R1 FOR TYPEOUT
     006424  104403                         TYPOS                   ;;GO TYPE--OCTAL ASCII
     006426     002                         .BYTE   2               ;;TYPE 2 DIGIT(S)
     006427     000                         .BYTE   0               ;;SUPPRESS LEADING ZEROS
     006430  104401  064676                  TYPE    ,BLNKS4         ;TYPE 4 BLANKS
83
     006434  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR MASS BUS
     006442  010160  000010                  MOV     R1,RMCS2(R0)    ;LOAD THE DRIVE ADDRESS
     006446  005760  000012                  TST     RMDS(R0)        ;ACCESS DRIVE REGISTER
     006452  032760  010000  000010          BIT     #NED,RMCS2(R0)  ;IS DRIVE PRESENT ?
     006460  001027                         BNE     3$              ;BR IF NO
     006462  032760  004000  000000          BIT     #DVA,RMCS1(R0)  ;IS DRIVE AVAILABLE ?
     006470  001426                         BEQ     4$              ;BR IF NO
     006472  012737  064522  006632          MOV     #$RM80,10$      ;ASSUME RM80 DEVICE
     006500  022760  020026  000026          CMP     #20026,RMDT(R0) ;SINGLE PORT RM80 ?
     006506  001407                         BEQ     2$              ;BR IF YES
     006510  022760  024026  000026          CMP     #24026,RMDT(R0) ;DUAL PORT RM80 ?
     006516  001403                         BEQ     2$              ;BR IF YES
     006520  104401  064527                  TYPE    ,NOTRM          ;DRIVE NOT AN RM80
     006524  000412                         BR      5$              ;CHECK NEXT DRIVE
```

GET VALUE FOR SOFTWARE SWITCH REGISTER

```
 98 006526  032760  010000  000012  2$:     BIT     #MOL,RMDS(R0)   ;IS MEDIUM ON LINE ?
 99 006534  001412                          BEQ     6$              ;BR IF NO
100 006536  000417                          BR      7$
101
102 006540  104401  064561          3$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
103 006544  000402                          BR      5$              ;CHECK NEXT DRIVE
104
105 006546  104401  064576          4$:     TYPE    ,NOTAVL         ;DRIVE NOT AVAILABLE
106 006552  146137  065004  001300  5$:     BICB    ATNTBL(R1),$DEVM        ;CLEAR DEVICE FROM BIT MAP
107 006560  000425                          BR      11$             ;CHECK NEXT DRIVE
108
109 006562  104401  064615          6$:     TYPE    ,UNTOFF         ;DRIVE OFFLINE
110 006566  146137  065004  001300          BICB    ATNTBL(R1),$DEVM        ;CLEAR DEVICE FROM BIT MAP
111 006574  000413                          BR      9$              ;PRINT DRIVE TYPE
112
113 006576  005737  001332          7$:     TST     XXDP            ;LOADED FROM RM80 ?
114 006602  001406                          BEQ     8$              ;NO
115 006604  123701  001332                  CMPB    XXDP,R1         ;IS THIS THE DRIVE ?
116 006610  001003                          BNE     8$              ;BR IF NO
117 006612  104401  064544                  TYPE    ,LODEV          ;DRIVE IS LOAD DEVICE
118 006616  000755                          BR      5$
119
120 006620  104401  064626          8$:     TYPE    ,UNTON          ;DRIVE ONLINE
121 006624  104401  064700          9$:     TYPE    ,BLNKS2         ;TYPE 2 BLANKS
122 006630  104401                          TYPE                    ;PRINT DRIVE TYPE
123 006632  000000                  10$:    .WORD   0               ;MESSAGE ADDRESS HERE
124
125 006634  005201                  11$:    INC     R1              ;INCREMENT THE DRIVE ADDRESS
126 006636  020127  000007                  CMP     R1,#7           ;ALL DRIVES ARE CHECKED ?
127 006642  003661                          BLE     1$              ;BRANCH IF NOT
128
129 006644  104401  001217          12$:    TYPE    ,$CRLF          ;CR-LF
130 006650  000137  007332                  JMP     CMNSTART        ;JUMP TO COMMON START
```

```
                                        .SBTTL  STANDALONE INPUT ROUTINES
                                
                                        STANDALONE:
006654                                  JSR     PC,$TKINT       ;INITIALIZE CONSOLE
006654  004737  061330
                                
006660  005227  177777                  INC     #-1             ;FIRST TIME THRU HERE ?
006664  001023                          BNE     2$              ;BR IF NO
                                
                                        ;SEE IF OPERATOR WANTS HELP TEXT
                                
006666  104401  063550                  TYPE    ,MSHELP         ;WANT HELP ?
006672  104411                          RDCHR                   ;GET RESPONSE
006674  012637  001176                  MOV     (SP)+,$TMP1     ;SAVE AND ECHO RESPONSE
006700  123727  001176  000131          CMPB    $TMP1,#'Y       ;WAS IT A YES RESPONSE ?
006706  001005                          BNE     1$              ;NO
006710  104401  001176                  TYPE    ,$TMP1          ;TYPE 'Y'
006714  104401  101716                  TYPE    ,HELP           ;YES - TYPE HELP TEXT
006720  000414                          BR      3$
006722  104401  064672          1$:     TYPE    ,N              ;TYPE 'N'
006726  104401  001217                  TYPE    ,$CRLF          ;CR-LF
006732  000407                          BR      3$
                                
                                        ;SEE IF USER WANTS TO CHANGE UNIBUS ADDRESS
006734                                  2$:
006734  005737  001330                  TST     CHGADR          ;CHANGE RH/RM BUS ADDRESS ?
006740  001457                          BEQ     7$              ;BR IF NO
006742  005037  001330                  CLR     CHGADR          ;NO CHANGE NEXT TIME
006746  104401  001217                  TYPE    ,$CRLF          ;CR-LF
                                
                                        ;DIALOGUE TO CHANGE THE UNIBUS ADDRESS, VECTOR ADDRESS AND INTERRUPT PRIORITY
006752                                  3$:
006752  104401  064161                  TYPE    ,CNSL01         ;TYPE CURRENT BUS ADDRESS
006756  013746  001276                  MOV     $BASE,-(SP)     ;;SAVE $BASE FOR TYPEOUT
006762  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
006764  104401  064700                  TYPE    ,BLNKS2         ;TYPE 2 BLANKS
006770  104413                          RDOCT                   ;GET NEW BUS ADDRESS
006772  012637  001176                  MOV     (SP)+,$TMP1     ;CARRIAGE RETURN ?
006776  001412                          BEQ     5$              ;YES-SKIP TO NEXT ENTRY
007000  022737  160000  001176          CMP     #160000,$TMP1   ;BASE ADDRESS IN I/O PAGE ?
007006  101403                          BLOS    4$              ;YES
007010  104401  064171                  TYPE    ,CNSL02         ;TYPE WARNING MESSAGE
007014  000756                          BR      3$              ;TRY AGAIN
007016  013737  001176  001276  4$:     MOV     $TMP1,$BASE     ;STORE NEW BUS ADDRESS
                                
007024  104401  064233          5$:     TYPE    ,CNSL03
007030  005046                          CLR     -(SP)
007032  113716  001272                  MOVB    $VECT1,(SP)     ;GET CURRENT VECTOR ADDRESS
007036  104402                          TYPOC
007040  104401  064700                  TYPE    ,BLNKS2         ;TYPE 2 BLANKS
007044  104413                          RDOCT                   ;GET NEW VECTOR ADDRESS
007046  012637  001176                  MOV     (SP)+,$TMP1     ;CARRIAGE RETURN?
007052  001412                          BEQ     7$              ;YES-SKIP TO NEXT ENTRY
007054  022737  001000  001176          CMP     #1000,$TMP1     ;VECTOR ADDRESS < 1000 ?
007062  101003                          BHI     6$              ;YES!!
007064  104401  064242                  TYPE    ,CNSL04         ;TYPE WARNING MESSAGE
007070  000755                          BR      5$              ;RETRY
007072  113737  001176  001272  6$:     MOVB    $TMP1,$VECT1    ;STORE NEW VECTOR ADDRESS
```

```
                                        ;DIALOGUE TO INPUT DEVICE NUMBERS
007100  005227  177777          7$:     INC     #-1             ;FIRST TIME THRU ?
007104  001002                          BNE     8$              ;BR IF NO
007106  104401  064276                  TYPE    ,CNSL07         ;TYPE INPUT INSTRUCTIONS
007112  104401  001217          8$:     TYPE    ,$CRLF          ;CR-LF
007116  005037  001300          9$:     CLR     $DEVM           ;CLEAR DEVICE MAP
007122  104401  064462                  TYPE    ,MSDRVS         ;TYPE 'DRIVE(S): '
007126  104411                          RDCHR
007130  012637  001176                  MOV     (SP)+,$TMP1     ;GET RESPONSE
007134  023727  001176  000101          CMP     $TMP1,#'A       ;IS INPUT "A" ?
007142  001007                          BNE     10$             ;NO
007144  104401  063534                  TYPE    ,ALL            ;YES, TYPE "ALL" AND GO
007150  012737  000377  001300          MOV     #377,$DEVM      ;SET DEVICE MAP FOR ALL DRIVES
007156  000137  006364                  JMP     XSIZ            ;AUTO SIZE.

007162  023727  001176  000015  10$:     CMP     $TMP1,#CR       ;CARRIAGE RETURN ?
007170  001436                          BEQ     12$             ;YES
007172  104401  001176                  TYPE    ,$TMP1          ;ECHO RESPONSE
007176  023727  001176  000060          CMP     $TMP1,#'0       ;NUMBER < 0 ?
007204  002430                          BLT     12$             ;YES
007206  023727  001176  000067          CMP     $TMP1,#'7       ;NUMBER > 7 ?
007214  003427                          BLE     13$             ;NO
007216  000423                          BR      12$             ;ILLEGAL INPUT

007220  104411          11$:    RDCHR
007222  012637  001176                  MOV     (SP)+,$TMP1     ;GET RESPONSE
007226  023727  001176  000015          CMP     $TMP1,#CR       ;CARRIAGE RETURN ?
007234  001432                          BEQ     14$             ;YES
007236  104401  063545                  TYPE    ,COMMA          ;TYPE ', '
007242  104401  001176                  TYPE    ,$TMP1          ;ECHO RESPONSE
007246  023727  001176  000060          CMP     $TMP1,#'0       ;NUMBER < 0 ?
007254  002404                          BLT     12$             ;YES
007256  023727  001176  000067          CMP     $TMP1,#'7       ;NUMBER > 7 ?
007264  003403                          BLE     13$             ;NO
007266  104401  064440          12$:    TYPE    ,CNSL08         ;TYPE " ?ILLEGAL INPUT"
007272  000711                          BR      9$              ;RETRY

007274  013701  001176          13$:    MOV     $TMP1,R1        ;R1 = DRIVE NUMBER
007300  042701  177770                  BIC     #^C7,R1
007304  156137  065004  001300          BISB    ATNTBL(R1),$DEVM        ;SET DEVICE IN MAP
007312  122737  000377  001300          CMPB    #377,$DEVM      ;DONE ?
007320  101337                          BHI     11$             ;NO
007322  104401  001217          14$:    TYPE    ,$CRLF          ;CR-LF
007326  000137  006364                  JMP     XSIZ            ;GO SIZE DEVICES
```

```
                                        ;ASSEMBLE TEST QUE FROM DEVICE MAP
007332                                  CMNSTART:
007332  104401  064636                          TYPE    ,DRIVES         ;TYPE 'DRIVE(S) TO BE TESTED'
007336  013700  001300                          MOV     $DEVM,R0        ;R0 = DEVICE MAP
007342  001004                                  BNE     1$              ;BR IF DRIVES TO TEST
007344  104401  063545                          TYPE    ,COMMA          ;TYPE ', '
007350  104401  064665                          TYPE    ,NONE           ;TYPE 'NONE'
007354  012701  001470                  1$:     MOV     #TSTQUE+2,R1    ;R1 = ADDRESS OF FIRST ENTRY IN QUE
007360  010137  001466                          MOV     R1,TSTQUE       ;INITIALIZE ENTRY POINTER
007364  012702  000001                          MOV     #1,R2           ;R2 = DEVICE POINTER
007370  005003                                  CLR     R3              ;R3 = DEVICE NUMBER
007372  030200                          2$:     BIT     R2,R0           ;IS THIS DEVICE IN MAP ?
007374  001413                                  BEQ     3$              ;NO !!
007376  104401  063545                          TYPE    ,COMMA          ;TYPE ', '
007402  010311                                  MOV     R3,(R1)         ;YES - ENTER DEVICE NUMBER IN QUE
007404  010346                                  MOV     R3,-(SP)        ;;SAVE R3 FOR TYPEOUT
007406  104403                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
007410     001                                  .BYTE   1               ;;TYPE 1 DIGIT(S)
007411     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
007412  116361  065004  000001                  MOVB    ATNTBL(R3),1(R1);ENTER ATTENTION BIT IN QUE
007420  062701  000002                          ADD     #2,R1           ;ADVANCE ENTRY POINTER
007424  006302                          3$:     ASL     R2              ;ADVANCE DEVICE POINTER
007426  105702                                  TSTB    R2              ;DONE ALL DEVICES ?
007430  001402                                  BEQ     4$              ;YES
007432  005203                                  INC     R3              ;ADVANCE DEVICE NUMBER
007434  000756                                  BR      2$              ;ENTER NEXT DEVICE
007436  005011                          4$:     CLR     (R1)            ;TERMINATE TEST QUE
007440  104401  001217                          TYPE    ,$CRLF          ;CR-LF

                                        ;SIZE FOR CLOCK
007444  004737  036234                          JSR     PC,SIZCLK       ;SEE IF CLOCK PRESENT
007450  000425                                  BR      6$              ;YES - CLOCK IS PRESENT
007452  104401  007460                          TYPE    ,65$            ;;TYPE ASCIZ STRING
007456  000413                                  BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <CRLF>/NO 'L' OR 'P' CLOCK/
007506                                  64$:
007506  005737  000042                          TST     @#42            ;ANY MONITOR PRESENT ?
007512  001002                                  BNE     5$              ;BR IF YES
007514  000137  005434                          JMP     START           ;JUMP TO START
007520  000137  031372                  5$:     JMP     $GET42          ;RETURN CONTROL TO MONITOR
007524                                  6$:

007524  000240                          READY:  NOP                     ;READY TO START TEST
007526  105737  001300                          TSTB    $DEVM           ;ANY DRIVES IN MAP ?
007532  001007                                  BNE     2$              ;BR IF YES
007534  005737  000042                          TST     @#42            ;ANY MONITOR PRESENT ?
007540  001002                                  BNE     1$              ;BR IF YES
007542  000137  005434                          JMP     START           ;JUMP TO START
007546  000137  031372                  1$:     JMP     $GET42          ;RETURN CONTROL TO MONITOR

007552  105037  001116                  2$:     CLRB    $TSTNM          ;RESET TEST NUMBER
007556  005037  001206                          CLR     $TIMES          ;INITIALIZE NUMBER OF ITERATIONS
007562  005037  001326                          CLR     CTLFG           ;CLEAR CONTROL-C FLAG
007566  005037  001512                          CLR     MEDENB          ;CLEAR MEDIA ENABLE
007572  004737  061330                          JSR     PC,$TKINT       ;INITIALIZE TTY
007576  012746  000240                          MOV     #PR5,-(SP)      ;;PUT NEW PS ON STACK
007602  012746  007610                          MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
```

```
007606  000002                          RTI                     ;;POP NEW PC AND PS
007610                          64$:
    51 007610  117737  171652  001234          MOVB    @TSTQUE,$UNIT   ;LOAD DRIVE NUMBER
    52
    53                          ;CLEAR MASSBUS CONTROLLER, SELECT DRIVE AND SET LAST TRACK ADDRESS
 .  54 007616  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
    55 007622  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR MASSBUS
    56 007630  113760  001234  000010          MOVB    $UNIT,RMCS2(R0) ;SELECT DEVICE UNDER TEST
    57 007636  012737  006400  001334          MOV     #TA8!TA4!TA1,LSTRK      ;SET LAST TRACK = 13.
    58
    59                          ;TYPE DRIVE NUMBER TO BE TESTED($UNIT)
    60 007644  104401  001217                  TYPE    ,$CRLF          ;CR-LF
    61 007650  104401  064476                  TYPE    ,MSGDRV         ;TYPE 'DRIVE'
    62 007654  013746  001234                  MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
                                                                       ;;TYPE DRIVE NUMBER
    007660  104403                            TYPOS                   ;;GO TYPE--OCTAL ASCII
    007662     002                            .BYTE   2               ;;TYPE 2 DIGIT(S)
    007663     000                            .BYTE   0               ;;SUPPRESS LEADING ZEROS
    63 007664  005004                          CLR     R4              ;THESE TWO LOOPS ARE ADDED TO
    64 007666  005304                          DEC     R4              ;WAIT FOR TTY
    65 007670  001376                          BNE     .-2
    66 007672  005304                          DEC     R4
    67 007674  001376                          BNE     .-2
```

```
                        ;;*****************************************************************
                        ;*TEST 1         CONTROLLER ACCESS TEST
                        ;;*****************************************************************
007676                  TST1:
007676  000004                SCOPE                   ;SCOPE CALL
007700  000240                NOP                     ;START OF TEST
007702  012706  001100        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
007706  013700  001276        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
007712  013701  001466        MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
007716  012737  000001 001226 MOV     #1,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
007724  005001                CLR     R1
007726  013746  000004        MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
007732  013746  000006        MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
007736  012737  010040 000004 MOV     #1$,ERRVEC
007744  012737  000300 000006 MOV     #PR6,ERRVEC+2

007752  110160  000001        MOVB    R1,RMCS1+1(R0)  ;MOVE HI BYTE TO RMCS1
007756  010160  000002        MOV     R1,RMWC(R0)     ;MOVE WORD COUNT REGISTER
007762  016002  000002        MOV     RMWC(R0),R2
007766  010160  000004        MOV     R1,RMBA(R0)     ;MOVE BUS ADDRESS REGISTER
007772  016002  000004        MOV     RMBA(R0),R2
007776  016046  000010        MOV     RMCS2(R0),-(SP)         ;;PUSH RMCS2(R0) ON STACK
010002  010160  000010        MOV     R1,RMCS2(R0)    ;MOVE CONTROL STATUS REGISTER
010006  016002  000010        MOV     RMCS2(R0),R2
010012  012660  000010        MOV     (SP)+,RMCS2(R0)         ;;POP STACK INTO RMCS2(R0)
010016  010160  000022        MOV     R1,RMDB(R0)     ;MOVE DATA BUFFER
010022  016002  000022        MOV     RMDB(R0),R2
010026  012637  000006        MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
010032  012637  000004        MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
010036  000417                BR      3$              ;NO BUS TIMEOUT OCCURRED

010040  022626        1$:     CMP     (SP)+,(SP)+     ;ADJUST STACK
010042  012637  000006        MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
010046  012637  000004        MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
010052  104110                EMT     110
010054  005737  000042        TST     @#42            ;STAND ALONE MODE ?
010060  001002                BNE     2$              ;NO!!
010062  000137  005424        JMP     START1          ;YES-GO GET $BASE
010066  005037  001300 2$:     CLR     $DEVM           ;FUDGE NO DRIVES IN MAP
010072  000137  031372        JMP     $GET42          ;RETURN CONTROL TO MONITOR
010076  3$:

                        ;;*****************************************************************
                        ;*TEST 2         FORMAT ZEROS
                        ;;*****************************************************************
010076                  TST2:
010076  000004                SCOPE                   ;SCOPE CALL
010100  000240                NOP                     ;START OF TEST
010102  012706  001100        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
010106  013700  001276        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
010112  013701  001466        MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
010116  012737  000002 001226 MOV     #2,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
010124  012737  000000 001444 MOV     #0,RMOFO        ;18 BIT FORMAT
```

```
                                        1$:
010132                                          ;CYLINDER = 559.
010132  012737  001057  001446                  MOV     #559.,RMDCO     ;CYLINDER = 559.
010140  012737  001000  001420                  MOV     #TA2,RMDAO      ;TRACK = 2, SECTOR = 0
010146  012737  177376  001414                  MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
010154  012737  101716  001416                  MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
010162  012737  000062  001412                  MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA

                                        ;VERIFY THAT SECTOR IS NOT BAD
010170  004737  032406                          JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
010174  000405                                  BR      2$              ;GO TO 2$ IF NO ERROR
010176  104401  063446                          TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
010202  104000                                  EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
010204  000137  011010                          JMP     23$             ;GO TO 23$ IF ERROR
010210                                  2$:
010210  012737  065116  001174                  MOV     #ZEROS,$TMP0    ;USE ALL ZEROS DATA PATTERN
010216  012737  000001  001176                  MOV     #1,$TMP1
010224  004737  034640                          JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
010230                                  3$:

                                        ;PREPARE DEVICE FOR DATA TRANSFER
010230  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
010234  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                ;CLEAR CONTROLLER & SELECT DEVICE
                                                                ;VERIFY CONTROLLER CLEAR OPERATION
                                                                ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                ;VERIFY PACK ACKNOWLEDGE
                                                                ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                ;VERIFY RECALIBRATION
010236  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
010240  000240                          NOP                     ;RETURN HERE IF ERROR
010242  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
010244  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
010250                          4$:

                                        ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
010250  012737  000004  001412          MOV     #SEEK,RMCS1O    ;CHANGE COMMAND TO SEEK
010256  012702  001555                  MOV     #PUTINX,R2      ;WRITE REGISTER INDEX TABLE
010262  112722  000006                  MOVB    #RMDA,(R2)+
010266  112722  000034                  MOVB    #RMDC,(R2)+
010272  112722  000032                  MOVB    #RMOF,(R2)+
010276  112722  000000                  MOVB    #RMCS1,(R2)+
010302  112722  000200                  MOVB    #200,(R2)+

010306  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
010312  000404                          BR      5$              ;GO TO 5$ IF NO ERROR
010314  000240                          NOP                     ;RETURN HERE IF ERROR
010316  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
010320  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
010324                          5$:
010324  012702  000002                  MOV     #2,R2           ;DO 2 CLOCK CYCLES
010330  004737  036520          6$:     JSR     PC,STIMER       ;START CLOCK TIMER
010334  032777  000200  171160  7$:     BIT     #BIT7,@CLKADR   ;TIMER DONE??
010342  001774                          BEQ     7$              ;NO!!
010344  005302                          DEC     R2              ;DEC NUMBER OF CYCLES
010346  001370                          BNE     6$              ;CONTINUE IF NOT DONE
```

```
     73 010350  012737  000005  001412          MOV     #SEEK!GO,RMCS10 ;EXECUTE SEEK COMMAND
     74
     75 010356  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        010362  000404                          BR      8$              ;GO TO 8$ IF NO ERROR
        010364  000240                          NOP                     ;RETURN HERE IF ERROR
        010366  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        010370  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
     76 010374                          8$:
     77
     78                                 ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
     79 010374  004737  035450                  JSR     PC,GETSTS       ;SETUP FOR STATUS
     80 010400  004737  036356                  JSR     PC,TIMOUT       ;WAIT FOR SEEK TO COMPLETE
     81 010404                          9$:
     82
     83                                 ;GO READ SEEK STATUS
     84 010404  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        010410  000404                          BR      10$             ;GO TO 10$ IF NO ERROR
        010412  000240                          NOP                     ;RETURN HERE IF ERROR
        010414  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        010416  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
     85 010422                          10$:
     86
     87                                 ;VERIFY THE RESULTS OF THE SEEK COMMAND
     88 010422  004737  044174                  JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
        010426  000405                          BR      11$             ;GO TO 11$ IF NO ERROR
        010430  000240                          NOP                     ;RETURN HERE IF ERROR
        010432  104000                          EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
        010434  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        010436  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
     89 010442                          11$:
     90
     91                                 ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
     92 010442  012737  000063  001412          MOV     #WH!GO,RMCS10   ;WRITE HEADER AND DATA
     93 010450  012702  001560                  MOV     #PUTINX+3,R2    ;EXTEND REGISTER INDEX TABLE
     94 010454  112722  000002                  MOVB    #RMWC,(R2)+
     95 010460  112722  000004                  MOVB    #RMBA,(R2)+
     96 010464  112722  000000                  MOVB    #RMCS1,(R2)+
     97 010470  112722  000200                  MOVB    #200,(R2)+
     98
     99 010474  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        010500  000404                          BR      12$             ;GO TO 12$ IF NO ERROR
        010502  000240                          NOP                     ;RETURN HERE IF ERROR
        010504  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        010506  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
    100 010512                          12$:
    101
    102                                 ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
    103 010512  004737  036356                  JSR     PC,TIMOUT       ;WAIT FOR COMMAND TO COMPLETE
    104
    105 010516  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        010522  000404                          BR      13$             ;GO TO 13$ IF NO ERROR
        010524  000240                          NOP                     ;RETURN HERE IF ERROR
        010526  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        010530  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
    106 010534                          13$:
    107
    108                                 ;VERIFY RESULTS OF WRITE COMMAND
```

```
    109 010534  004737  036552              JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        010540  000405                      BR      14$             ;GO TO 14$ IF NO ERROR
        010542  000240                      NOP                     ;RETURN HERE IF ERROR
        010544  104000                      EMT                     ;ERROR # DEFINED BY PRIERR SUBRCUTINE
        010546  004736                      JSR     PC,@(SP)+       ;GO CACK FOR MORE ERROR CHECKS
        010550  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
    110 010554                          14$:
    111 010554  004737  051612              JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        010560  000405                      BR      15$             ;GO TO 15$ IF NO ERROR
        010562  000240                      NOP                     ;RETURN HERE IF ERROR
        010564  104000                      EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        010566  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        010570  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
    112 010574                          15$:
    113 010574  004737  037404              JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        010600  000405                      BR      16$             ;GO TO 16$ IF NO ERROR
        010602  000240                      NOP                     ;RETURN HERE IF ERROR
        010604  104000                      EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        010606  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        010610  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
    114 010614                          16$:
    115
    116                                 ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
    117 010614  012737  000073  001412      MOV     #RH!GO,RMCS10           ;READ HEADER & DATA COMMAND
    118 010622  012737  102722  001416      MOV     #BUFTWO,RMBA0           ;CHANGE BUS ADDRESS
    119
    120 010630  004737  036004              JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        010634  000404                      BR      17$             ;GO TO 17$ IF NO ERROR
        010636  000240                      NOP                     ;RETURN HERE IF ERROR
        010640  104000                      EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        010642  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
    121 010646                          17$:
    122
    123                                 ;WAIT FOR READ TO COMPLETE AND GE  STATUS
    124 010646  004737  036356              JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
    125
    126 010652  004737  035534              JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        010656  000404                      BR      18$             ;GO TO 18$ IF NO ERROR
        010660  000240                      NOP                     ;RETURN HERE IF ERROR
        010662  104000                      EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        010664  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
    127 010670                          18$:
    128
    129                                 ;VERIFY THE RESULTS OF READ OPERATION
    130 010670  004737  036552              JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        010674  000405                      BR      19$             ;GO TO 19$ IF NO ERROR
        010676  000240                      NOP                     ;RETURN HERE IF ERROR
        010700  104000                      EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        010702  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        010704  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
    131 010710                          19$:
    132 010710  004737  051612              JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        010714  000405                      BR      20$             ;GO TO 20$ IF NO ERROR
        010716  000240                      NOP                     ;RETURN HERE IF ERROR
        010720  104000                      EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        010722  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        010724  000137  011010              JMP     23$             ;GO TO 23$ IF ERROR
```

```
    133 010730                                  20$:
    134 010730  004737  037404                          JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        010734  000405                          BR      21$             ;GO TO 21$ IF NO ERROR
        010736  000240                          NOP                     ;RETURN HERE IF ERROR
        010740  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        010742  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        010744  000137  011010                  JMP     23$             ;GO TO 23$ IF ERROR
    135 010750                                  21$:
    136
    137                                         ;VERIFY DATA
    138 010750  004737  035106                  JSR     PC,CMPBUF       ;GO COMPARE WRITE, READ DATA BUFFERS
        010754  101716                          .WORD   BUFONE          ;STARTING ADDRESS OF WRITE BUFFER
        010756  102722                          .WORD   BUFTWO          ;STARTING ADDRESS OF READ BUFFER
        010760  000402                          BR      22$             ;GO TO 22$ IF NO ERROR
        010762  000240                          NOP                     ;RETURN HERE IF ERROR
        010764  104000                          EMT                     ;ERROR # DEFINED BY CMPBUF SUBROUTINE
    139 010766                                  22$:
    140 010766  032737  010000  001444          BIT     #FMT16,RMOFO    ;TEST 16 BIT MODE YET ?
    141 010774  001005                          BNE     23$             ;YES
    142 010776  012737  010000  001444          MOV     #FMT16,RMOFO    ;SET 16 BIT MODE AND
    143 011004  000137  010132                  JMP     1$              ;TEST AGAIN.
    144 011010                                  23$:
    145
    146                                         ;;*****************************************************************
                                                ;*TEST 3         ZERO FILL TEST
                                                ;;*****************************************************************
        011010                                  TST3:
        011010  000004                          SCOPE                   ;SCOPE CALL
        011012  000240                          NOP                     ;START OF TEST
        011014  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK POINTER
        011020  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        011024  013701  001466                  MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
        011030  012737  000003  001226          MOV     #3,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
    147
    148                                         ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
    149 01 036  012737  001057  001446          MOV     #559.,RMDCO     ;CYLINDER = 559.
    150 011044  012737  001000  001420          MOV     #TA2,RMDAO      ;TRACK = 2, SECTOR = 0
    151 011052  012737  010000  001444          MOV     #FMT16,RMOFO    ;16 BIT FORMAT
    152 011060  012737  177376  001414          MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
    153 011066  012737  101716  001416          MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
    154 011074  012737  000062  001412          MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA
    155
    156                                         ;VERIFY THAT SECTOR IS NOT BAD
        011102  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
        011106  000405                          BR      1$              ;GO TO 1$ IF NO ERROR
        011110  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
        011114  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
        011116  000137  011644                  JMP     18$             ;GO TO 18$ IF ERROR
    157 011122                                  1$:
    158 011122  012737  065116  001174          MOV     #ZEROS,$TMP0    ;USE ALL ZEROS DATA PATTERN
    159 011130  012737  000001  001176          MOV     #1,$TMP1
    160 011136  004737  034640                  JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
    161 011142                                  2$:
    162
    163                                         ;PREPARE DEVICE FOR DATA TRANSFER
    164 011142  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
        011146  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
```

```
                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                        ;VERIFY PACK ACKNOWLEDGE
                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                        ;VERIFY RECALIBRATION
011150  000404                      BR      3$          ;GO TO 3$ IF NO ERROR
011152  000240                      NOP                 ;RETURN HERE IF ERROR
011154  104000                      EMT                 ;ERROR # DEFINED BY TSTPRP SUBROUTINE
011156  000137  011644              JMP     18$         ;GO TO 18$ IF ERROR
165 011162                  3$:
166
167                         ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
168 011162  012737  000005  001412      MOV     #SEEK!GO,RMCS10 ;CHANGE COMMAND TO SEEK
169 011170  012702  001555              MOV     #PUTINX,R2      ;WRITE REGISTER INDEX TABLE
170 011174  112722  000006              MOVB    #RMDA,(R2)+
171 011200  112722  000034              MOVB    #RMDC,(R2)+
172 011204  112722  000032              MOVB    #RMOF,(R2)+
173 011210  112722  000000              MOVB    #RMCS1,(R2)+
174 011214  112722  000200              MOVB    #200,(R2)+
175
176 011220  004737  036004              JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
011224  000404                      BR      4$          ;GO TO 4$ IF NO ERROR
011226  000240                      NOP                 ;RETURN HERE IF ERROR
011230  104000                      EMT                 ;ERROR # DEFINED BY PUT SUBROUTINE
011232  000137  011644              JMP     18$         ;GO TO 18$ IF ERROR
177 011236                  4$:
178
179                         ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
180 011236  004737  035450              JSR     PC,GETSTS       ;SETUP FOR STATUS
181 011242  004737  036356              JSR     PC,TIMOUT       ;WAIT FOR SEEK TO COMPLETE
182 011246                  5$:
183
184                         ;GO READ SEEK STATUS
185 011246  004737  035534              JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
011252  000404                      BR      6$          ;GO TO 6$ IF NO ERROR
011254  000240                      NOP                 ;RETURN HERE IF ERROR
011256  104000                      EMT                 ;ERROR # DEFINED BY GET SUBROUTINE
011260  000137  011644              JMP     18$         ;GO TO 18$ IF ERROR
186 011264                  6$:
187
188                         ;VERIFY THE RESULTS OF THE SEEK COMMAND
189 011264  004737  044174              JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
011270  000405                      BR      7$          ;GO TO 7$ IF NO ERROR
011272  000240                      NOP                 ;RETURN HERE IF ERROR
011274  104000                      EMT                 ;ERROR # DEFINED BY SEKSTS SUBROUTINE
011276  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
011300  000137  011644              JMP     18$         ;GO TO 18$ IF ERROR
190 011304                  7$:
191
192                         ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
193 011304  012737  177776  001414      MOV     #-2,RMWCO               ;FORMAT PARTIAL SECTOR
194 011312  012737  000063  001412      MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
195 011320  012702  001560              MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
196 011324  112722  000002              MOVB    #RMWC,(R2)+
197 011330  112722  000004              MOVB    #RMBA,(R2)+
```

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    198 011334  112722  000000                      MOVB    #RMCS1,(R2)+
    199 011340  112722  000200                      MOVB    #200,(R2)+
    200
    201 011344  004737  036004                      JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        011350  000404                              BR      8$              ;GO TO 8$ IF NO ERROR
        011352  000240                              NOP                     ;RETURN HERE IF ERROR
        011354  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        011356  000137  011644                      JMP     18$             ;GO TO 18$ IF ERROR
    202 011362                              8$:
    203
    204                                 ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
    205 011362  004737  036356                      JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
    206
    207 011366  004737  035534                      JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        011372  000404                              BR      9$              ;GO TO 9$ IF NO ERROR
        011374  000240                              NOP                     ;RETURN HERE IF ERROR
        011376  104000                              EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        011400  000137  011644                      JMP     18$             ;GO TO 18$ IF ERROR
    208 011404                              9$:
    209
    210                                 ;VERIFY RESULTS OF WRITE COMMAND
    211 011404  004737  036552                      JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        011410  000405                              BR      10$             ;GO TO 10$ IF NO ERROR
        011412  000240                              NOP                     ;RETURN HERE IF ERROR
        011414  104000                              EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        011416  004736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        011420  000137  011644                      JMP     18$             ;GO TO 18$ IF ERROR
    212 011424                              10$:
    213 011424  004737  051612                      JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        011430  000405                              BR      11$             ;GO TO 11$ IF NO ERROR
        011432  000240                              NOP                     ;RETURN HERE IF ERROR
        011434  104000                              EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        011436  004736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        011440  000137  011644                      JMP     18$             ;GO TO 18$ IF ERROR
    214 011444                              11$:
    215 011444  004737  037404                      JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        011450  000405                              BR      12$             ;GO TO 12$ IF NO ERROR
        011452  000240                              NOP                     ;RETURN HERE IF ERROR
        011454  104000                              EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        011456  004736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        011460  000137  011644                      JMP     18$             ;GO TO 18$ IF ERROR
    216 011464                              12$:
    217
    218                                 ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
    219 011464  012737  177376  001414              MOV     #-258.,RMWC0    ;2 + 256 WORDS (2'S COMP)
    220 011472  012737  000073  001412              MOV     #RH!GO,RMCS10           ;READ HEADER & DATA COMMAND
    221 011500  012737  102722  001416              MOV     #BUFTWO,RMBA0           ;CHANGE BUS ADDRESS
    222
    223 011506  004737  036004                      JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        011512  000404                              BR      13$             ;GO TO 13$ IF NO ERROR
        011514  000240                              NOP                     ;RETURN HERE IF ERROR
        011516  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        011520  000137  011644                      JMP     18$             ;GO TO 18$ IF ERROR
    224 011524                              13$:
    225
    226                                 ;WAIT FOR READ TO COMPLETE AND GET STATUS
    227 011524  004737  036356                      JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
```

```
                                                ;GO READ REGISTER(S) WITH GET SUBROUTINE
011530  004737  035534          JSR     PC,GET
011534  000404                  BR      14$             ;GO TO 14$ IF NO ERROR
011536  000240                  NOP                     ;RETURN HERE IF ERROR
011540  104000                  EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
011542  000137  011644          JMP     18$             ;GO TO 18$ IF ERROR
011546                  14$:

                        ;VERIFY THE RESULTS OF READ OPERATION
011546  004737  036552          JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
011552  000405                  BR      15$             ;GO TO 15$ IF NO ERROR
011554  000240                  NOP                     ;RETURN HERE IF ERROR
011556  104000                  EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
011560  004736                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
011562  000137  011644          JMP     18$             ;GO TO 18$ IF ERROR
011566                  15$:
011566  004737  051612          JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
011572  000405                  BR      16$             ;GO TO 16$ IF NO ERROR
011574  000240                  NOP                     ;RETURN HERE IF ERROR
011576  104000                  EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
011600  004736                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
011602  000137  011644          JMP     18$             ;GO TO 18$ IF ERROR
011606                  16$:
011606  004737  037404          JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
011612  000405                  BR      17$             ;GO TO 17$ IF NO ERROR
011614  000240                  NOP                     ;RETURN HERE IF ERROR
011616  104000                  EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
011620  004736                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
011622  000137  011644          JMP     18$             ;GO TO 18$ IF ERROR
011626                  17$:

                        ;VERIFY DATA
011626  004737  035106          JSR     PC,CMPBUF       ;GO COMPARE WRITE, READ DATA BUFFERS
011632  101716                  .WORD   BUFONE          ;STARTING ADDRESS OF WRITE BUFFER
011634  102722                  .WORD   BUFTWO          ;STARTING ADDRESS OF READ BUFFER
011636  000402                  BR      18$             ;GO TO 18$ IF NO ERROR
011640  000240                  NOP                     ;RETURN HERE IF ERROR
011642  104000                  EMT                     ;ERROR # DEFINED BY CMPBUF SUBROUTINE
011644                  18$:

                        ;;*******************************************************************
                        ;*TEST 4         FORMAT CHECK ZEROS
                        ;;*******************************************************************
011644                  TST4:
011644  000004                  SCOPE                   ;SCOPE CALL
011646  000240                  NOP                     ;START OF TEST
011650  012706  001100          MOV     #STACK,SP       ;INITIALIZE STACK POINTER
011654  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
011660  013701  001466          MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
011664  012737  000004  001226  MOV     #4,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
011672  012737  001057  001446  MOV     #559.,RMDC0     ;CYLINDER = 559.
011700  012737  001000  001420  MOV     #TA2,RMDA0      ;TRACK = 2, SECTOR = 0
011706  012737  010000  001444  MOV     #FMT16,RMOF0    ;16 BIT FORMAT
011714  012737  177376  001414  MOV     #-258.,RMWC0    ;2 + 256 WORDS (2'S COMP)
011722  012737  101716  001416  MOV     #BUFONE,RMBA0   ;DATA BUFFER ADDRESS
```

```
                                        ;WRITE HEADER AND DATA
252 011730  012737  000062  001412          MOV     #WH,RMCS1O
253
254                                     ;VERIFY THAT SECTOR IS NOT BAD
    011736  0C4737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
    011742  000405                          BR      1$              ;GO TO 1$ IF NO ERROR
    011744  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
    011750  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
    011752  000137  012434                  JMP     18$             ;GO TO 18$ IF ERROR
255 011756                              1$:
256 011756  012737  065116  001174          MOV     #ZEROS,$TMP0    ;USE ALL ZEROS DATA PATTERN
257 011764  012737  000001  001176          MOV     #1,$TMP1
258 011772  004737  034640                  JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
259 011776                              2$:
260
261                                     ;PREPARE DEVICE FOR DATA TRANSFER
262 011776  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
    012002  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                    ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                    ;CLEAR CONTROLLER & SELECT DEVICE
                                                                    ;VERIFY CONTROLLER CLEAR OPERATION
                                                                    ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                    ;VERIFY PACK ACKNOWLEDGE
                                                                    ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                    ;VERIFY RECALIBRATION
    012004  000404                          BR      3$              ;GO TO 3$ IF NO ERROR
    012006  000240                          NOP                     ;RETURN HERE IF ERROR
    012010  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
    012012  000137  012434                  JMP     18$             ;GO TO 18$ IF ERROR
263 012016                              3$:
264
265                                     ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
266 012016  012737  000005  001412          MOV     #SEEK!GO,RMCS1O ;CHANGE COMMAND TO SEEK
267 012024  012702  001555                  MOV     #PUTINX,R2      ;WRITE REGISTER INDEX TABLE
268 012030  112722  000006                  MOVB    #RMDA,(R2)+
269 012034  112722  000034                  MOVB    #RMDC,(R2)+
270 012040  112722  000032                  MOVB    #RMOF,(R2)+
271 012044  112722  000000                  MOVB    #RMCS1,(R2)+
272 012050  112722  000200                  MOVB    #200,(R2)+
273
274 012054  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
    012060  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
    012062  000240                          NOP                     ;RETURN HERE IF ERROR
    012064  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
    012066  000137  012434                  JMP     18$             ;GO TO 18$ IF ERROR
275 012072                              4$:
276
277                                     ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
278 012072  004737  035450                  JSR     PC,GETSTS               ;SETUP FOR STATUS
279 012076  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
280 012102                              5$:
281
282                                     ;GO READ SEEK STATUS
283 012102  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
    012106  000404                          BR      6$              ;GO TO 6$ IF NO ERROR
    012110  000240                          NOP                     ;RETURN HERE IF ERROR
    012112  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
    012114  000137  012434                  JMP     18$             ;GO TO 18$ IF ERROR
```

```
                                        6$:

                                        ;VERIFY THE RESULTS OF THE SEEK COMMAND
012120  004737  044174                        JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
012124  000405                                BR      7$              ;GO TO 7$ IF NO ERROR
012126  000240                                NOP                     ;RETURN HERE IF ERROR
012130  104000                                EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
012132  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012134  000137  012434                        JMP     18$             ;GO TO 18$ IF ERROR
012140                                  7$:

                                        ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
012140  012737  000063  001412                MOV     #WH!GO,RMCS1O           ;WRITE HEADER AND DATA
012146  012702  001560                        MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
012152  112722  000002                        MOVB    #RMWC,(R2)+
012156  112722  000004                        MOVB    #RMBA,(R2)+
012162  112722  000000                        MOVB    #RMCS1,(R2)+
012166  112722  000200                        MOVB    #200,(R2)+

012172  004737  036004                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
012176  000404                                BR      8$              ;GO TO 8$ IF NO ERROR
012200  000240                                NOP                     ;RETURN HERE IF ERROR
012202  104000                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
012204  000137  012434                        JMP     18$             ;GO TO 18$ IF ERROR
012210                                  8$:

                                        ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
012210  004737  036356                        JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE

012214  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
012220  000404                                BR      9$              ;GO TO 9$ IF NO ERROR
012222  000240                                NOP                     ;RETURN HERE IF ERROR
012224  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
012226  000137  012434                        JMP     18$             ;GO TO 18$ IF ERROR
012232                                  9$:

                                        ;VERIFY RESULTS OF WRITE COMMAND
012232  004737  036552                        JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
012236  000405                                BR      10$             ;GO TO 10$ IF NO ERROR
012240  000240                                NOP                     ;RETURN HERE IF ERROR
012242  104000                                EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
012244  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012246  000137  012434                        JMP     18$             ;GO TO 18$ IF ERROR
012252                                  10$:
012252  004737  051612                        JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
012256  000405                                BR      11$             ;GO TO 11$ IF NO ERROR
012260  000240                                NOP                     ;RETURN HERE IF ERROR
012262  104000                                EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
012264  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012266  000137  012434                        JMP     18$             ;GO TO 18$ IF ERROR
012272                                  11$:
012272  004737  037404                        JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
012276  000405                                BR      12$             ;GO TO 12$ IF NO ERROR
012300  000240                                NOP                     ;RETURN HERE IF ERROR
012302  104000                                EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
012304  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012306  000137  012434                        JMP     18$             ;GO TO 18$ IF ERROR
```

```
                                        12$:
                                        ;WRITE CHECK HEADER AND DATA FOR SECTOR JUST WRITTEN
012312                                          MOV     #WCH!GO,RMCS10          ;WRITE CHECK COMMAND

012320  004737  036004                       JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
012324  000404                               BR      13$             ;GO TO 13$ IF NO ERROR
012326  000240                               NOP                     ;RETURN HERE IF ERROR
012330  104000                               EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
012332  000137  012434                       JMP     18$             ;GO TO 18$ IF ERROR
012336                                  13$:

                                        ;WAIT FOR WRITE CHECK TO COMPLETE AND GET STATUS
012336  004737  036356                       JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE

012342  004737  035534                       JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
012346  000404                               BR      14$             ;GO TO 14$ IF NO ERROR
012350  000240                               NOP                     ;RETURN HERE IF ERROR
012352  104000                               EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
012354  000137  012434                       JMP     18$             ;GO TO 18$ IF ERROR
012360                                  14$:

                                        ;VERIFY THE RESULTS OF WRITE CHECK OPERATION
012360  004737  036552                       JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
012364  000405                               BR      15$             ;GO TO 15$ IF NO ERROR
012366  000240                               NOP                     ;RETURN HERE IF ERROR
012370  104000                               EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
012372  004736                               JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012374  000137  012434                       JMP     18$             ;GO TO 18$ IF ERROR
012400                                  15$:
012400  004737  051612                       JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
012404  000405                               BR      16$             ;GO TO 16$ IF NO ERROR
012406  000240                               NOP                     ;RETURN HERE IF ERROR
012410  104000                               EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
012412  004736                               JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012414  000137  012434                       JMP     18$             ;GO TO 18$ IF ERROR
012420                                  16$:
012420  004737  037404                       JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
012424  000403                               BR      17$             ;GO TO 17$ IF NO ERROR
012426  000240                               NOP                     ;RETURN HERE IF ERROR
012430  104000                               EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
012432  004736                               JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012434                                  17$:

012434                                  18$:

                                        ;;*************************************************************************
                                        ;*TEST 5         FORMAT CHECK ZEROS W/ WCE ERROR
                                        ;;*************************************************************************
012434                                  TST5:
012434  000004                               SCOPE                   ;SCOPE CALL
012436  000240                               NOP                     ;START OF TEST
012440  012706  001100                       MOV     #STACK,SP       ;INITIALIZE STACK POINTER
012444  013700  001276                       MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
012450  013701  001466                       MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
012454  012737  000005  001226               MOV     #5,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
```

```
                                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
012462  012737  001057  001446                MOV     #559.,RMDCO     ;CYLINDER = 559.
012470  012737  001000  001420                MOV     #TA2,RMDAO      ;TRACK = 2, SECTOR = 0
012476  012737  010000  001444                MOV     #FMT16,RMOFO    ;16 BIT FORMAT
012504  012737  177376  001414                MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
012512  012737  101716  001416                MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
012520  012737  000062  001412                MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA

                                        ;VERIFY THAT SECTOR IS NOT BAD
012526  004737  032406                        JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
012532  000405                              BR      1$              ;GO TO 1$ IF NO ERROR
012534  104401  063446                      TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
012540  104000                              EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
012542  000137  013374                      JMP     20$             ;GO TO 20$ IF ERROR
012546                                  1$:
012546  012737  065116  001174                MOV     #ZEROS,$TMPO    ;USE ALL ONES DATA PATTERN
012554  012737  000001  001176                MOV     #1,$TMP1
012562  004737  034640                        JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
012566                                  2$:

                                        ;PREPARE DEVICE FOR DATA TRANSFER
012566  004737  031456                        JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
012572  154130                              .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                    ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                    ;CLEAR CONTROLLER & SELECT DEVICE
                                                                    ;VERIFY CONTROLLER CLEAR OPERATION
                                                                    ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                    ;VERIFY PACK ACKNOWLEDGE
                                                                    ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                    ;VERIFY RECALIBRATION
012574  000404                              BR      3$              ;GO TO 3$ IF NO ERROR
012576  000240                              NOP                     ;RETURN HERE IF ERROR
012600  104000                              EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
012602  000137  013374                      JMP     20$             ;GO TO 20$ IF ERROR
012606                                  3$:

                                        ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
012606  012737  000005  001412                MOV     #SEEK!GO,RMCS10 ;CHANGE COMMAND TO SEEK
012614  012702  001555                        MOV     #PUTINX,R2      ;WRITE REGISTER INDEX TABLE
012620  112722  000006                        MOVB    #RMDA,(R2)+
012624  112722  000034                        MOVB    #RMDC,(R2)+
012630  112722  000032                        MOVB    #RMOF,(R2)+
012634  112722  000000                        MOVB    #RMCS1,(R2)+
012640  112722  000200                        MOVB    #200,(R2)+

012644  004737  036004                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
012650  000404                              BR      4$              ;GO TO 4$ IF NO ERROR
012652  000240                              NOP                     ;RETURN HERE IF ERROR
012654  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
012656  000137  013374                      JMP     20$             ;GO TO 20$ IF ERROR
012662                                  4$:

                                        ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
012662  004737  035450                        JSR     PC,GETSTS       ;SETUP FOR STATUS
012666  004737  036356                        JSR     PC,TIMOUT       ;WAIT FOR SEEK TO COMPLETE
012672                                  5$:
```

```
                                        ;GO READ SEEK STATUS
012672  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
012676  000404                                BR      6$              ;GO TO 6$ IF NO ERROR
012700  000240                                NOP                     ;RETURN HERE IF ERROR
012702  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
012704  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
012710                                  6$:

                                        ;VERIFY THE RESULTS OF THE SEEK COMMAND
012710  004737  044174                        JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
012714  000405                                BR      7$              ;GO TO 7$ IF NO ERROR
012716  000240                                NOP                     ;RETURN HERE IF ERROR
012720  104000                                EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
012722  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
012724  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
012730                                  7$:

                                        ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
012730  012737  000063  001412                MOV     #WH!GO,RMCS10   ;WRITE HEADER AND DATA
012736  012702  001560                        MOV     #PUTINX+3,R2    ;EXTEND REGISTER INDEX TABLE
012742  112722  000002                        MOVB    #RMWC,(R2)+
012746  112722  000004                        MOVB    #RMBA,(R2)+
012752  112722  000000                        MOVB    #RMCS1,(R2)+
012756  112722  000200                        MOVB    #200,(R2)+

012762  004737  036004                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
012766  000404                                BR      8$              ;GO TO 8$ IF NO ERROR
012770  000240                                NOP                     ;RETURN HERE IF ERROR
012772  104000                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
012774  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
013000                                  8$:

                                        ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
013000  004737  036356                        JSR     PC,TIMOUT       ;WAIT FOR COMMAND TO COMPLETE

013004  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
013010  000404                                BR      9$              ;GO TO 9$ IF NO ERROR
013012  000240                                NOP                     ;RETURN HERE IF ERROR
013014  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
013016  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
013022                                  9$:

                                        ;VERIFY RESULTS OF WRITE COMMAND
013022  004737  036552                        JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
013026  000405                                BR      10$             ;GO TO 10$ IF NO ERROR
013030  000240                                NOP                     ;RETURN HERE IF ERROR
013032  104000                                EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
013034  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
013036  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
013042                                  10$:
013042  004737  051612                        JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
013046  000405                                BR      11$             ;GO TO 11$ IF NO ERROR
013050  000240                                NOP                     ;RETURN HERE IF ERROR
013052  104000                                EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
013054  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
013056  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
013062                                  11$:
```

```
    405 013062  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        013066  000405                          BR      12$             ;GO TO 12$ IF NO ERROR
        013070  000240                          NOP                     ;RETURN HERE IF ERROR
        013072  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        013074  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        013076  000137  013374                  JMP     20$             ;GO TO 20$ IF ERROR
    406 013102                          12$:
    407
    408                                 ;ALTER DATA BUFFER
    409 013102  005137  102720                  COM     BUFTWO-2        ;COMPLEMENT LAST DATA WORD
    410
    411                                 ;SETUP AND WRITE CHECK HEADER AND DATA COMMAND
    412 013106  012737  000053  001412          MOV     #WCH!GO,RMCS1O  ;WRITE CHECK COMMAND
    413
    414 013114  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        013120  000404                          BR      13$             ;GO TO 13$ IF NO ERROR
        013122  000240                          NOP                     ;RETURN HERE IF ERROR
        013124  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        013126  000137  013374                  JMP     20$             ;GO TO 20$ IF ERROR
    415 013132                          13$:
    416
    417                                 ;WAIT FOR WRITE CHECK COMMAND TO COMPLETE AND READ STATUS
    418 013132  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMMAND TO COMPLETE
    419
    420 013136  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        013142  000404                          BR      14$             ;GO TO 14$ IF NO ERROR
        013144  000240                          NOP                     ;RETURN HERE IF ERROR
        013146  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINF
        013150  000137  013374                  JMP     20$             ;GO TO 20$ IF ERROR
    421 013154                          14$:
    422
    423                                 ;CHECK FOR PRIMARY ERRORS
    424 013154  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        013160  000405                          BR      15$             ;GO TO 15$ IF NO ERROR
        013162  000240                          NOP                     ;RETURN HERE IF ERROR
        013164  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        013166  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        013170  000137  013374                  JMP     20$             ;GO TO 20$ IF ERROR
    425 013174                          15$:
    426
    427                                 ;MAKE SURE THE WRITE CHECK ERROR WAS DETECTED
    428 013174  032737  040000  001346          BIT     #WCE,RMCS2I             ;IS WRITE CHECK ERROR SET??
    429 013202  001023                          BNE     17$                     ;YES!!
    430
    431 013204  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        013210  000405                          BR      16$             ;GO TO 16$ IF NO ERROR
        013212  000240                          NOP                     ;RETURN HERE IF ERROR
        013214  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        013216  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        013220  000137  013374                  JMP     20$             ;GO TO 20$ IF ERROR
    432
    433 013224  013737  001346  001140  16$:     MOV     RMCS2I,$GDDAT           ;LOAD EXPECTED STATUS
    434 013232  052737  040000  001140          BIS     #WCE,$GDDAT
    435 013240  013737  001346  001142          MOV     RMCS2I,$BDDAT           ;LOAD RECEIVED STATUS
    436 013246  104337                          EMT     337
    437 013250  000451                          BR      20$
    438 013252                          17$:
```

```
                                        ;VERIFY THE ADDRESS OF THE WRITE CHECK ERROR
013252  012737  102720  001134                MOV     #BUFTWO-2,$GDADR        ;LOAD EXPECTED ADDRESS
013260  013737  001342  001136                MOV     RMBAI,$BDADR            ;LOAD RECEIVED ADDRESS
013266  162737  000002  001136                SUB     #2,$BDADR               ;DECREMENT RECEIVED ADDRESS

                                        ;GET WCE DATA AND VERIFY IT IS OK
013274  112737  000022  001526                MOVB    #RMDB,GETINX            ;SETUP FOR READING RMDB
013302  112737  000200  001527                MOVB    #200,GETINX+1

013310  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
013314  000404                                BR      18$             ;GO TO 18$ IF NO ERROR
013316  000240                                NOP                     ;RETURN HERE IF ERROR
013320  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
013322  000137  013374                        JMP     20$             ;GO TO 20$ IF ERROR
013326  013737  013360  001142  18$:   MOV     RMDBI,$BDDAT            ;LOAD RECEIVED DATA WORD
013334  013737  102720  001140            MOV     BUFTWO-2,$GDDAT         ;LOAD EXPECTED DATA WORD
013342  005137  001140                    COM     $GDDAT
013346  023737  001134  001136            CMP     $GDADR,$BDADR           ;IS ADDRESS OK??
013354  001402                            BEQ     19$                     ;YES!!
013356  104340                            EMT     340
013360  000405                            BR      20$
013362  023737  001140  001142  19$:   CMP     $GDDAT,$BDDAT           ;IS DATA WORD OK??
013370  001401                            BEQ     20$                     ;YES!!
013372  104341                            EMT     341
013374                                20$:

                                        ;;*****************************************************************
                                        ;*TEST 6        FORMAT ONES
                                        ;;*****************************************************************
013374                                  TST6:
013374  000004                                SCOPE                   ;SCOPE CALL
013376  000240                                NOP                     ;START OF TEST
013400  012706  001100                        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
013404  013700  001276                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
013410  013701  001466                        MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
013414  012737  000006  001226                MOV     #6,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
013422  012737  001057  001446                MOV     #559.,RMDCO     ;CYLINDER = 559.
013430  012737  001000  001420                MOV     #TA2,RMDAO      ;TRACK = 2, SECTOR = 0
013436  012737  010000  001444                MOV     #FMT16,RMOFO    ;16 BIT FORMAT
013444  012737  177376  001414                MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
013452  012737  101716  001416                MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
013460  012737  000062  001412                MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA

                                        ;VERIFY THAT SECTOR IS NOT BAD
013466  004737  032406                        JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
013472  000405                                BR      1$              ;GO TO 1$ IF NO ERROR
013474  104401  063446                        TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
013500  104000                                EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
013502  000137  014214                        JMP     18$             ;GO TO 18$ IF ERROR
013506                                  1$:
013506  012737  065054  001174                MOV     #ONES,$TMP0     ;USE ALL ONES DATA PATTERN
013514  012737  000001  001176                MOV     #1,$TMP1
013522  004737  034640                        JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
013526                                  2$:
```

```
                                        ;PREPARE DEVICE FOR DATA TRANSFER
013526  004737  031456                        JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
013532  154130                              .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                    ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                    ;CLEAR CONTROLLER & SELECT DEVICE
                                                                    ;VERIFY CONTROLLER CLEAR OPERATION
                                                                    ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                    ;VERIFY PACK ACKNOWLEDGE
                                                                    ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                    ;VERIFY RECALIBRATION
013534  000404                              BR      3$              ;GO TO 3$ IF NO ERROR
013536  000240                              NOP                     ;RETURN HERE IF ERROR
013540  104000                              EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
013542  000137  014214                      JMP     18$             ;GO TO 18$ IF ERROR
013546                                  3$:

                                        ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
013546  012737  000005  001412              MOV     #SEEK'GO,RMCS10         ;CHANGE COMMAND TO SEEK
013554  012702  001555                      MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
013560  112722  000006                      MOVB    #RMDA,(R2)+
013564  112722  000034                      MOVB    #PMDC,(R2)+
013570  112722  000032                      MOVB    #RMOF,(R2)+
013574  112722  000000                      MOVB    #RMCS1,(R2)+
013600  112722  000200                      MOVB    #200,(R2)+

013604  004737  036004                      JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
013610  000404                              BR      4$              ;GO TO 4$ IF NO ERROR
013612  000240                              NOP                     ;RETURN HERE IF ERROR
013614  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
013616  000137  014214                      JMP     18$             ;GO TO 18$ IF ERROR
013622                                  4$:

                                        ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
013622  004737  035450                      JSR     PC,GETSTS               ;SETUP FOR STATUS
013626  004737  036356                      JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
013632                                  5$:

                                        ;GO READ SEEK STATUS
013632  004737  035534                      JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
013636  000404                              BR      6$              ;GO TO 6$ IF NO ERROR
013640  000240                              NOP                     ;RETURN HERE IF ERROR
013642  104000                              EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
013644  000137  014214                      JMP     18$             ;GO TO 18$ IF ERROR
013650                                  6$:

                                        ;VERIFY THE RESULTS OF THE SEEK COMMAND
013650  004737  044174                      JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
013654  000405                              BR      7$              ;GO TO 7$ IF NO ERROR
013656  000240                              NOP                     ;RETURN HERE IF ERROR
013660  104000                              EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
013662  004736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
013664  000137  014214                      JMP     18$             ;GO TO 18$ IF ERROR
013670                                  7$:

                                        ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
013670  012737  000063  001412              MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
```

```
                                        MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
                                        MOVB    #RMWC,(R2)+
                                        MOVB    #RMBA,(R2)+
                                        MOVB    #RMCS1,(R2)+
                                        MOVB    #200,(R2)+

                                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                                        BR      8$              ;GO TO 8$ IF NO ERROR
                                        NOP                     ;RETURN HERE IF ERROR
                                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                                        JMP     18$             ;GO TO 18$ IF ERROR
                                8$:

                                ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
                                        JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE

                                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
                                        BR      9$              ;GO TO 9$ IF NO ERROR
                                        NOP                     ;RETURN HERE IF ERROR
                                        EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
                                        JMP     18$             ;GO TO 18$ IF ERROR
                                9$:

                                ;VERIFY RESULTS OF WRITE COMMAND
                                        JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
                                        BR      10$             ;GO TO 10$ IF NO ERROR
                                        NOP                     ;RETURN HERE IF ERROR
                                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
                                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                                        JMP     18$             ;GO TO 18$ IF ERROR
                                10$:
                                        JSR     PC,DTAS~S       ;GO VERIFY RESULTS OF DATA TRANSFER
                                        BR      11$             ;GO TO 11$ IF NO ERROR
                                        NOP                     ;RETURN HERE IF ERROR
                                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
                                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                                        JMP     18$             ;GO TO 18$ IF ERROR
                                11$:
                                        JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
                                        BR      12$             ;GO TO 12$ IF NO ERROR
                                        NOP                     ;RETURN HERE IF ERROR
                                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
                                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                                        JMP     18$             ;GO TO 18$ IF ERROR
                                12$:

                                ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
                                        MOV     #RH!GO,RMCS10           ;READ HEADER & DATA COMMAND
                                        MOV     #BUFTWO,RMBA0           ;CHANGE BUS ADDRESS

                                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                                        BR      13$             ;GO TO 13$ IF NO ERROR
                                        NOP                     ;RETURN HERE IF ERROR
                                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                                        JMP     18$             ;GO TO 18$ IF ERROR
                                13$:
```

```
                                        ;WAIT FOR READ TO COMPLETE AND GET STATUS
014074  004737  036356                          JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE

014100  004737  035534                          JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
014104  000404                                  BR      14$             ;GO TO 14$ IF NO ERROR
014106  000240                                  NOP                     ;RETURN HERE IF ERROR
014110  104000                                  EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
014112  000137  014214                          JMP     18$             ;GO TO 18$ IF ERROR
014116                                  14$:

                                        ;VERIFY THE RESULTS OF READ OPERATION
014116  004737  036552                          JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
014122  000405                                  BR      15$             ;GO TO 15$ IF NO ERROR
014124  000240                                  NOP                     ;RETURN HERE IF ERROR
014126  104000                                  EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
014130  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
014132  000137  014214                          JMP     18$             ;GO TO 18$ IF ERROR
014136                                  15$:
014136  004737  051612                          JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
014142  000405                                  BR      16$             ;GO TO 16$ IF NO ERROR
014144  000240                                  NOP                     ;RETURN HERE IF ERROR
014146  104000                                  EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
014150  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
014152  000137  014214                          JMP     18$             ;GO TO 18$ IF ERROR
014156                                  16$:
014156  004737  037404                          JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
014162  000405                                  BR      17$             ;GO TO 17$ IF NO ERROR
014164  000240                                  NOP                     ;RETURN HERE IF ERROR
014166  104000                                  EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
014170  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
014172  000137  014214                          JMP     18$             ;GO TO 18$ IF ERROR
014176                                  17$:

                                        ;VERIFY DATA
014176  004737  035106                          JSR     PC,CMPBUF       ;GO COMPARE WRITE, READ DATA BUFFERS
014202  101716                                  .WORD   BUFONE          ;STARTING ADDRESS OF WRITE BUFFER
014204  102722                                  .WORD   BUFTWO          ;STARTING ADDRESS OF READ BUFFER
014206  000402                                  BR      18$             ;GO TO 18$ IF NO ERROR
014210  000240                                  NOP                     ;RETURN HERE IF ERROR
014212  104000                                  EMT                     ;ERROR # DEFINED BY CMPBUF SUBROUTINE
014214                                  18$:

                                        ;;**********************************************************************
                                        ;*TEST 7         FORMAT CHECK ONES
                                        ;;**********************************************************************
014214                                  TST7:
014214  000004                                  SCOPE                   ;SCOPE CALL
014216  000240                                  NOP                     ;START OF TEST
014220  012706  001100                          MOV     #STACK,SP       ;INITIALIZE STACK POINTER
014224  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
014230  013701  001466                          MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
014234  012737  000007  001226                  MOV     #7,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
014242  012737  001057  001446                  MOV     #559.,RMDC0     ;CYLINDER = 559.
014250  012737  001000  001420                  MOV     #TA2,RMDA0      ;TRACK = 2, SECTOR = 0
014256  012737  010000  001444                  MOV     #FMT16,RMOF0    ;16 BIT FORMAT
```

```
                                                MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
                                                MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
                                                MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA

                                        ;VERIFY THAT SECTOR IS NOT BAD
                                                JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
                                                BR      1$              ;GO TO 1$ IF NO ERROR
                                                TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
                                                EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
                                                JMP     18$             ;GO TO 18$ IF ERROR
                                        1$:
                                                MOV     #ONES,$TMPO     ;USE ALL ONES DATA PATTERN
                                                MOV     #1,$TMP1
                                                JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
                                        2$:

                                        ;PREPARE DEVICE FOR DATA TRANSFER
                                                JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
                                                .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF "SKI" OR 'PIP" IS SET
                                                                        ;VERIFY RECALIBRATION
                                                BR      3$              ;GO TO 3$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
                                                JMP     18$             ;GO TO 18$ IF ERROR
                                        3$:

                                        ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
                                                MOV     #SEEK!GO,RMCS10         ;CHANGE COMMAND TO SEEK
                                                MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
                                                MOVB    #RMDA,(R2)+
                                                MOVB    #RMDC,(R2)+
                                                MOVB    #RMOF,(R2)+
                                                MOVB    #RMCS1,(R2)+
                                                MOVB    #200,(R2)+

                                                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                                                BR      4$              ;GO TO 4$ IF NO ERROR
                                                NOP                     ;RETURN HERF IF ERROR
                                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                                                JMP     18$             ;GO TO 18$ IF ERROR
                                        4$:

                                        ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
                                                JSR     PC,GETSTS               ;SETUP FOR STATUS
                                                JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
                                        5$:

                                        ;GO READ SEEK STATUS
                                                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
                                                BR      6$              ;GO TO 6$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
```

```
        014462  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        014464  000137  015004                  JMP     18$             ;GO TO 18$ IF ERROR
    598 014470                          6$:
    599
    600                                 ;VERIFY THE RESULTS OF THE SEEK COMMAND
    601 014470  004737  044174                  JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
        014474  000405                          BR      7$              ;GO TO 7$ IF NO ERROR
        014476  000240                          NOP                     ;RETURN HERE IF ERROR
        014500  104000                          EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
        014502  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        014504  000137  015004                  JMP     18$             ;GO TO 18$ IF ERROR
    602 014510                          7$:
    603
    604                                 ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
    605 014510  012737  000063  001412          MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
    606 014516  012702  001560                  MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
    607 014522  112722  000002                  MOVB    #RMWC,(R2)+
    608 014526  112722  000004                  MOVB    #RMBA,(R2)+
    609 014532  112722  000000                  MOVB    #RMCS1,(R2)+
    610 014536  112722  000200                  MOVB    #200,(R2)+
    611
    612 014542  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        014546  000404                          BR      8$              ;GO TO 8$ IF NO ERROR
        014550  000240                          NOP                     ;RETURN HERE IF ERROR
        014552  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        014554  000137  015004                  JMP     18$             ;GO TO 18$ IF ERROR
    613 014560                          8$:
    614
    615                                 ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
    616 014560  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
    617
    618 014564  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        014570  000404                          BR      9$              ;GO TO 9$ IF NO ERROR
        014572  000240                          NOP                     ;RETURN HERE IF ERROR
        014574  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        014576  000137  015004                  JMP     18$             ;GO TO 18$ IF ERROR
    619 014602                          9$:
    620
    621                                 ;VERIFY RESULTS OF WRITE COMMAND
    622 014602  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        014606  000405                          BR      10$             ;GO TO 10$ IF NO ERROR
        014610  000240                          NOP                     ;RETURN HERE IF ERROR
        014612  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        014614  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        014616  000137  015004                  JMP     18$             ;GO TO 18$ IF ERROR
    623 014622                          10$:
    624 014622  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        014626  000405                          BR      11$             ;GO TO 11$ IF NO ERROR
        014630  000240                          NOP                     ;RETURN HERE IF ERROR
        014632  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        014634  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        014636  000137  015004                  JMP     18$             ;GO TO 18$ IF ERROR
    625 014642                          11$:
    626 014642  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        014646  000405                          BR      12$             ;GO TO 12$ IF NO ERROR
        014650  000240                          NOP                     ;RETURN HERE IF ERROR
        014652  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
```

```
014654  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
014656  000137  015004                   JMP     18$             ;GO TO 18$ IF ERROR
627 014662                          12$:
628
629                                 ;WRITE CHECK HEADER AND DATA FOR SECTOR JUST WRITTEN
630 014662  012737  000153  001412      MOV     #WCH!GO,RMCS1O  ;WRITE CHECK COMMAND
631
632 014670  004737  036004              JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
014674  000404                          BR      13$             ;GO TO 13$ IF NO ERROR
014676  000240                          NOP                     ;RETURN HERE IF ERROR
014700  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
014702  000137  015004                   JMP     18$             ;GO TO 18$ IF ERROR
633 014706                          13$:
634
635                                 ;WAIT FOR WRITE CHECK TO COMPLETE AND GET STATUS
636 014706  004737  036356              JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
637
638 014712  004737  035534              JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
014716  000404                          BR      14$             ;GO TO 14$ IF NO ERROR
014720  000240                          NOP                     ;RETURN HERE IF ERROR
014722  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
014724  000137  015004                   JMP     18$             ;GO TO 18$ IF ERROR
639 014730                          14$:
640
641                                 ;VERIFY THE RESULTS OF WRITE CHECK OPERATION
642 014730  004737  036552              JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
014734  000405                          BR      15$             ;GO TO 15$ IF NO ERROR
014736  000240                          NOP                     ;RETURN HERE IF ERROR
014740  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
014742  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
014744  000137  015004                   JMP     18$             ;GO TO 18$ IF ERROR
643 014750                          15$:
644 014750  004737  051612              JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
014754  000405                          BR      16$             ;GO TO 16$ IF NO ERROR
014756  000240                          NOP                     ;RETURN HERE IF ERROR
014760  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
014762  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
014764  000137  015004                   JMP     18$             ;GO TO 18$ IF ERROR
645 014770                          16$:
646 014770  004737  037404              JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
014774  000403                          BR      17$             ;GO TO 17$ IF NO ERROR
014776  000240                          NOP                     ;RETURN HERE IF ERROR
015000  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
015002  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
647 015004                          17$:
648
649 015004                          18$:
650
651                                 ;;*****************************************************************
                                    ;*TEST 10        FORMAT CHECK ONES W/ WCE ERRORS
                                    ;;*****************************************************************
015004                              TST10:
015004  000004                          SCOPE                   ;SCOPE CALL
015006  000240                          NOP                     ;START OF TEST
015010  012706  001100                   MOV     #STACK,SP       ;INITIALIZE STACK POINTER
015014  013700  001276                   MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
015020  013701  001466                   MOV     TSTGJE,R1       ;(R1) = DEVICE BEING TESTED
```

```
                015024  012737  000010  001226          MOV     #10,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
    652
    653                                         ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
    654 015032  012737  001057  001446          MOV     #559.,RMDC0     ;CYLINDER = 559.
    655 015040  012737  001000  001420          MOV     #TA2,RMDA0      ;TRACK = 2, SECTOR = 0
    656 015046  012737  010000  001444          MOV     #FMT16,RMOF0    ;16 BIT FORMAT
    657 015054  012737  177376  001414          MOV     #-258.,RMWC0    ;2 + 256 WORDS (2'S COMP)
    658 015062  012737  101716  001416          MOV     #BUFONE,RMBA0   ;DATA BUFFER ADDRESS
    659 015070  012737  000062  001412          MOV     #WH,RMCS10      ;WRITE HEADER AND DATA
    660
    661                                         ;VERIFY THAT SECTOR IS NOT BAD
                015076  004737  032406          JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
                015102  000405                  BR      1$              ;GO TO 1$ IF NO ERROR
                015104  104401  063446          TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
                015110  104000                  EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
                015112  000137  015742          JMP     20$             ;GO TO 20$ IF ERROR
    662 015116                                  1$:
    663 015116  012737  065054  001174          MOV     #ONES,$TMP0     ;USE ALL ONES DATA PATTERN
    664 015124  012737  000001  001176          MOV     #1,$TMP1
    665 015132  004737  034640                  JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
    666 015136                                  2$:
    667
    668                                         ;PREPARE DEVICE FOR DATA TRANSFER
    669 015136  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
                015142  154130                  .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                        ;VERIFY RECALIBRATION
                015144  000404                  BR      3$              ;GO TO 3$ IF NO ERROR
                015146  000240                  NOP                     ;RETURN HERE IF ERROR
                015150  104000                  EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
                015152  000137  015742          JMP     20$             ;GO TO 20$ IF ERROR
    670 015156                                  3$:
    671
    672                                         ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
    673 015156  012737  000005  001412          MOV     #SEEK!GO,RMCS10         ;CHANGE COMMAND TO SEEK
    674 015164  012702  001555                  MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
    675 015170  112722  000006                  MOVB    #RMDA,(R2)+
    676 015174  112722  000034                  MOVB    #RMDC,(R2)+
    677 015200  112722  000032                  MOVB    #RMOF,(R2)+
    678 015204  112722  000000                  MOVB    #RMCS1,(R2)+
    679 015210  112722  000200                  MOVB    #200,(R2)+
    680
    681 015214  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                015220  000404                  BR      4$              ;GO TO 4$ IF NO ERROR
                015222  000240                  NOP                     ;RETURN HERE IF ERROR
                015224  104000                  EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                015226  000137  015742          JMP     20$             ;GO TO 20$ IF ERROR
    682 015232                                  4$:
    683
    684                                         ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
    685 015232  004737  035450                  JSR     PC,GETSTS               ;SETUP FOR STATUS
    686 015236  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
```

```
687 015242                                  5$:
688
689                                         ;GO READ SEEK STATUS
690 015242  004737  035534                          JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
    015246  000404                                  BR      6$              ;GO TO 6$ IF NO ERROR
    015250  000240                                  NOP                     ;RETURN HERE IF ERROR
    015252  104000                                  EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
    015254  000137  015742                          JMP     20$             ;GO TO 20$ IF ERROR
691 015260                                  6$:
692
693                                         ;VERIFY THE RESULTS OF THE SEEK COMMAND
694 015260  004737  044174                          JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
    015264  000405                                  BR      7$              ;GO TO 7$ IF NO ERROR
    015266  000240                                  NOP                     ;RETURN HERE IF ERROR
    015270  104000                                  EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
    015272  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
    015274  000137  015742                          JMP     20$             ;GO TO 20$ IF ERROR
695 015300                                  7$:
696
697                                         ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
698 015300  012737  000063  001412                  MOV     #WH!GO,RMCS1O           ;WRITE HEADER AND DATA
699 015306  012702  001560                          MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
700 015312  112722  000002                          MOVB    #RMWC,(R2)+
701 015316  112722  000004                          MOVB    #RMBA,(R2)+
702 015322  112722  000000                          MOVB    #RMCS1,(R2)+
703 015326  112722  000200                          MOVB    #200,(R2)+
704
705 015332  004737  036004                          JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
    015336  000404                                  BR      8$              ;GO TO 8$ IF NO ERROR
    015340  000240                                  NOP                     ;RETURN HERE IF ERROR
    015342  104000                                  EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
    015344  000137  015742                          JMP     20$             ;GO TO 20$ IF ERROR
706 015350                                  8$:
707
708                                         ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
709 015350  004737  036356                          JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
710
711 015354  004737  035534                          JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
    015360  000404                                  BR      9$              ;GO TO 9$ IF NO ERROR
    015362  000240                                  NOP                     ;RETURN HERE IF ERROR
    015364  104000                                  EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
    015366  000137  015742                          JMP     20$             ;GO TO 20$ IF ERROR
712 015372                                  9$:
713
714                                         ;VERIFY RESULTS OF WRITE COMMAND
715 015372  004737  036552                          JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
    015376  000405                                  BR      10$             ;GO TO 10$ IF NO ERROR
    015400  000240                                  NOP                     ;RETURN HERE IF ERROR
    015402  104000                                  EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
    015404  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
    015406  000137  015742                          JMP     20$             ;GO TO 20$ IF ERROR
716 015412                                  10$:
717 015412  004737  051612                          JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
    015416  000405                                  BR      11$             ;GO TO 11$ IF NO ERROR
    015420  000240                                  NOP                     ;RETURN HERE IF ERROR
    015422  104000                                  EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
    015424  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
```

```
                015426  000137  015742                  JMP     20$             ;GO TO 20$ IF ERROR
716             015432                          11$:
719             015432  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
                015436  000405                          BR      12$             ;GO TO 12$ IF NO ERROR
                015440  000240                          NOP                     ;RETURN HERE IF ERROR
                015442  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
                015444  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                015446  000137  015742                  JMP     20$             ;GO TO 20$ IF ERROR
720             015452                          12$:
721
722                                             ;ALTER DATA BUFFER
723             015452  005137  102720                  COM     BUFTWO-2                ;COMPLEMENT DATA WORD
724
725                                             ;SETUP AND WRITE CHECK HEADER AND DATA COMMAND
726             015456  012737  000053  001412          MOV     #WCH!GO,RMCS1O  ;WRITE CHECK COMMAND
727
728             015464  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                015470  000404                          BR      13$             ;GO TO 13$ IF NO ERROR
                015472  000240                          NOP                     ;RETURN HERE IF ERROR
                015474  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                015476  000137  015742                  JMP     20$             ;GO TO 20$ IF ERROR
729             015502                          13$:
730
731                                             ;WAIT FOR WRITE CHECK COMMAND TO COMPLETE AND READ STATUS
732             015502  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMMAND TO COMPLETE
733
734             015506  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
                015512  000404                          BR      14$             ;GO TO 14$ IF NO ERROR
                015514  000240                          NOP                     ;RETURN HERE IF ERROR
                015516  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
                015520  000137  015742                  JMP     20$             ;GO TO 20$ IF ERROR
735             015524                          14$:
736
737                                             ;CHECK FOR PRIMARY ERRORS
738             015524  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
                015530  000405                          BR      15$             ;GO TO 15$ IF NO ERROR
                015532  000240                          NOP                     ;RETURN HERE IF ERROR
                015534  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
                015536  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                015540  000137  015742                  JMP     20$             ;GO TO 20$ IF ERROR
739             015544                          15$:
740
741                                             ;MAKE SURE THE WRITE CHECK ERROR WAS DETECTED
742             015544  032737  040000  001346          BIT     #WCE,RMCS2I             ;IS WRITE CHECK ERROR SET??
743             015552  001022                          BNE     17$                     ;YES!!
744
745             015554  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
                015560  000405                          BR      16$             ;GO TO 16$ IF NO ERROR
                015562  000240                          NOP                     ;RETURN HERE IF ERROR
                015564  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
                015566  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                015570  000137  015742                  JMP     20$             ;GO TO 20$ IF ERROR
746             015574  013737  001346  001140  16$:    MOV     RMCS2I,$GDDAT           ;LOAD EXPECTED STATUS
747             015602  052737  040000  001140          BIS     #WCE,$GDDAT
748             015610  013737  001346  001142          MOV     RMCS2I,$BDDAT           ;LOAD RECEIVED STATUS
749             015616  104337                          EMT     337
750             015620                          17$:
```

```
                                        ;VERIFY THE ADDRESS OF THE WRITE CHECK ERROR
015620  012737  102720  001134                MOV     #BUFTWO-2,$GDADR        ;LOAD EXPECTED ADDRESS
015626  013737  001342  001136                MOV     RMBAI,$BDADR            ;LOAD RECEIVED ADDRESS
015634  162737  000002  001136                SUB     #2,$BDADR               ;DECREMENT RECEIVED ADDRESS

                                        ;GET WCE DATA AND VERIFY IT IS OK
015642  112737  000022  001526                MOVB    #RMDB,GETINX            ;SETUP FOR READING RMDB
015650  112737  000200  001527                MOVB    #200,GETINX+1

015656  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
015662  000404                                BR      18$             ;GO TO 18$ IF NO ERROR
015664  000240                                NOP                     ;RETURN HERE IF ERROR
015666  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
015670  000137  015742                        JMP     20$             ;GO TO 20$ IF ERROR
015674  013737  001360  001142  18$:    MOV     RMDBI,$BDDAT            ;LOAD RECEIVED DATA WORD
015702  013737  102720  001140                MOV     BUFTWO-2,$GDDAT         ;LOAD EXPECTED DATA WORD
015710  005137  001140                        COM     $GDDAT
015714  023737  001134  001136                CMP     $GDADR,$BDADR           ;IS ADDRESS OK??
015722  001402                                BEQ     19$                     ;YES!!
015724  104340                                EMT     340
015726  000405                                BR      20$
015730                                  19$:
015730  023737  001140  001142                CMP     $GDDAT,$BDDAT           ;IS DATA WORD OK??
015736  001401                                BEQ     20$                     ;YES!!
015740  104341                                EMT     341
015742                                  20$:

                                        ;;*****************************************************************
                                        ;*TEST 11       FORMAT MULTIPLE SECTORS
                                        ;;*****************************************************************
015742                                  TST11:
015742  000004                                SCOPE                   ;SCOPE CALL
015744  000240                                NOP                     ;START OF TEST
015746  012706  001100                        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
015752  013700  001276                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
015756  013701  001466                        MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
015762  012737  000011  001226                MOV     #11,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
015770  012737  010000  001444                MOV     #FMT16,RMOFO    ;16 BIT FORMAT
015776                                  1$:
015776  012737  001057  001446                MOV     #559.,RMDCO     ;CYLINDER = 559.
016004  012737  001000  001420                MOV     #TA2,RMDAO      ;TRACK = 2, SECTOR = 0
016012  012737  176774  001414                MOV     #-258.*2,RMWCO  ;WORD COUNT FOR 2 SECTORS (2'S COMP)
016020  012737  101716  001416                MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
016026  012737  000062  001412                MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA

                                        ;VERIFY THAT SECTOR IS NOT BAD
016034  004737  032406                        JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
016040  000405                                BR      2$              ;GO TO 2$ IF NO ERROR
016042  104401  063446                        TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
016046  104000                                EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
016050  000137  016560                        JMP     19$             ;GO TO 19$ IF ERROR
016054                                  2$:
016054  012737  065116  001174                MOV     #ZEROS,$TMP0    ;USE ALL ZEROS DATA PATTERN
016062  012737  000001  001176                MOV     #1,$TMP1
```

```
                                                JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
                                        3$:
                                        ;PREPARE DEVICE FOR DATA TRANSFER
                                                JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
                                                .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                        ;VERIFY RECALIBRATION
                                                BR      4$              ;GO TO 4$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
                                                JMP     19$             ;GO TO 19$ IF ERROR
                                        4$:
                                        ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
                                                MOV     #SEEK!GO,RMCS10         ;CHANGE COMMAND TO SEEK
                                                MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
                                                MOVB    #RMDA,(R2)+
                                                MOVB    #RMDC,(R2)+
                                                MOVB    #RMOF,(R2)+
                                                MOVB    #RMCS1,(R2)+
                                                MOVB    #200,(R2)+

                                                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                                                BR      5$              ;GO TO 5$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                                                JMP     19$             ;GO TO 19$ IF ERROR
                                        5$:

                                        ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
                                                JSR     PC,GETSTS               ;SETUP FOR STATUS
                                                JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
                                        6$:

                                        ;GO READ SEEK STATUS
                                                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
                                                BR      7$              ;GO TO 7$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
                                                JMP     19$             ;GO TO 19$ IF ERROR
                                        7$:

                                        ;VERIFY THE RESULTS OF THE SEEK COMMAND
                                                JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
                                                BR      8$              ;GO TO 8$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
                                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                                                JMP     19$             ;GO TO 19$ IF ERROR
                                        8$:
```

```
                                        ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
016236  012737  000063  001412            MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
016244  012702  001560                    MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
016250  112722  000002                    MOVB    #RMWC,(R2)+
016254  112722  000004                    MOVB    #RMBA,(R2)+
016260  112722  000000                    MOVB    #RMCS1,(R2)+
016264  112722  000200                    MOVB    #200,(R2)+

016270  004737  036004                    JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
016274  000404                            BR      9$              ;GO TO 9$ IF NO ERROR
016276  000240                            NOP                     ;RETURN HERE IF ERROR
016300  104000                            EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
016302  000137  016560                    JMP     19$             ;GO TO 19$ IF ERROR
016306                                  9$:

                                        ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
016306  004737  036356                    JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE

016312  004737  035534                    JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
016316  000404                            BR      10$             ;GO TO 10$ IF NO ERROR
016320  000240                            NOP                     ;RETURN HERE IF ERROR
016322  104000                            EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
016324  000137  016560                    JMP     19$             ;GO TO 19$ IF ERROR
016330                                  10$:

                                        ;VERIFY RESULTS OF WRITE COMMAND
016330  004737  036552                    JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
016334  000405                            BR      11$             ;GO TO 11$ IF NO ERROR
016336  000240                            NOP                     ;RETURN HERE IF ERROR
016340  104000                            EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
016342  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
016344  000137  016560                    JMP     19$             ;GO TO 19$ IF ERROR
016350                                  11$:
016350  004737  051612                    JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
016354  000405                            BR      12$             ;GO TO 12$ IF NO ERROR
016356  000240                            NOP                     ;RETURN HERE IF ERROR
016360  104000                            EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
016362  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
016364  000137  016560                    JMP     19$             ;GO TO 19$ IF ERROR
016370                                  12$:
016370  004737  037404                    JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
016374  000405                            BR      13$             ;GO TO 13$ IF NO ERROR
016376  000240                            NOP                     ;RETURN HERE IF ERROR
016400  104000                            EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
016402  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
016404  000137  016560                    JMP     19$             ;GO TO 19$ IF ERROR
016410                                  13$:

                                        ;WRITE CHECK HEADER AND DATA FOR SECTORS JUST WRITTEN
016410  012737  000053  001412            MOV     #WCH!GO,RMCS10  ;WRITE CHECK COMMAND

016416  004737  036004                    JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
016422  000404                            BR      14$             ;GO TO 14$ IF NO ERROR
016424  000240                            NOP                     ;RETURN HERE IF ERROR
016426  104000                            EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
016430  000137  016560                    JMP     19$             ;GO TO 19$ IF ERROR
016434                                  14$:
```

```
                                        ;WAIT FOR WRITE CHECK TO COMPLETE AND GET STATUS
016434  004737  036356                        JSR     PC,TIMOUT               ;WAIT FOR WRITE CHECK TO FINISH

016440  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
016444  000404                                BR      15$             ;GO TO 15$ IF NO ERROR
016446  000240                                NOP                     ;RETURN HERE IF ERROR
016450  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
016452  000137  016560                        JMP     19$             ;GO TO 19$ IF ERROR
016456                                  15$:

                                        ;VERIFY THE RESULTS OF WRITE CHECK OPERATION
016456  004737  036552                        JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
016462  000405                                BR      16$             ;GO TO 16$ IF NO ERROR
016464  000240                                NOP                     ;RETURN HERE IF ERROR
016466  104000                                EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
016470  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
016472  000137  016560                        JMP     19$             ;GO TO 19$ IF ERROR
016476                                  16$:
016476  004737  051612                        JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
016502  000405                                BR      17$             ;GO TO 17$ IF NO ERROR
016504  000240                                NOP                     ;RETURN HERE IF ERROR
016506  104000                                EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
016510  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
016512  000137  016560                        JMP     19$             ;GO TO 19$ IF ERROR
016516                                  17$:
016516  004737  037404                        JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
016522  000405                                BR      18$             ;GO TO 18$ IF NO ERROR
016524  000240                                NOP                     ;RETURN HERE IF ERROR
016526  104000                                EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
016530  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
016532  000137  016560                        JMP     19$             ;GO TO 19$ IF ERROR
016536                                  18$:
016536  032737  001000  001444                BIT     #SSEI,RMOFO     ;TEST 16 BIT MODE W/ SSEI YET ?
016544  001005                                BNE     19$             ;YES !!
016546  052737  001000  001444                BIS     #SSEI,RMOFO     ;SET SSEI IN OFFSET AND
016554  000137  015776                        JMP     1$              ;TEST AGAIN.
016560                                  19$:

                                        ;;*************************************************************************
                                        ;*TEST 12       READ HEADER & DATA W/ HEAD SWITCHING
                                        ;;*************************************************************************
016560                                  TST12:
016560  000004                                SCOPE                   ;SCOPE CALL
016562  000240                                NOP                     ;START OF TEST
016564  012706  001100                        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
016570  013700  001276                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
016574  013701  001466                        MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
016600  012737  000012  001226                MOV     #12,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
016606  012737  001036  001420                MOV     #TA2!30.,RMDAO  ;TRACK = 2, SECTOR = 30.
016614  012737  010000  001444                MOV     #FMT16,RMOFO    ;16 BIT FORMAT
016622                                  1$:
016622  012737  001057  001446                MOV     #559.,RMDCO     ;CYLINDER = 559.
016630  012737  176774  001414                MOV     #-258.*2,RMWCO  ;WORD COUNT FOR 2 SECTORS (2'S COMP)
016636  012737  101716  001416                MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
```

```
881 016644                              2$:
882
883                                     ;PREPARE DEVICE FOR DATA TRANSFER
884 016644  004737  031456                      JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
    016650  154130                              .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF ''SKI'' OR 'PIP'' IS SET
                                                                        ;VERIFY RECALIBRATION
    016652  000404                              BR      3$              ;GO TO 3$ IF NO ERROR
    016654  000240                              NOP                     ;RETURN HERE IF ERROR
    016656  104000                              EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
    016660  000137  017220                      JMP     13$             ;GO TO 13$ IF ERROR
885 016664                              3$:
886
887                                     ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
888 016664  012737  000005  001412              MOV     #SEEK!GO,RMCS10         ;CHANGE COMMAND TO SEEK
889 016672  012702  001555                      MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
890 016676  112722  000006                      MOVB    #RMDA,(R2)+
891 016702  112722  000034                      MOVB    #RMDC,(R2)+
892 016706  112722  000032                      MOVB    #RMOF,(R2)+
893 016712  112722  000000                      MOVB    #RMCS1,(R2)+
894 016716  112722  000200                      MOVB    #200,(R2)+
895
896 016722  004737  036004                      JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
    016726  000404                              BR      4$              ;GO TO 4$ IF NO ERROR
    016730  000240                              NOP                     ;RETURN HERE IF ERROR
    016732  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
    016734  000137  017220                      JMP     13$             ;GO TO 13$ IF ERROR
897 016740                              4$:
898
899                                     ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
900 016740  004737  035450                      JSR     PC,GETSTS               ;SETUP FOR STATUS
901 016744  004737  036356                      JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
902 016750                              5$:
903
904                                     ;GO READ SEEK STATUS
905 016750  004737  035534                      JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
    016754  000404                              BR      6$              ;GO TO 6$ IF NO ERROR
    016756  000240                              NOP                     ;RETURN HERE IF ERROR
    016760  104000                              EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
    016762  000137  017220                      JMP     13$             ;GO TO 13$ IF ERROR
906 016766                              6$:
907
908                                     ;VERIFY THE RESULTS OF THE SEEK COMMAND
909 016766  004737  044174                      JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
    016772  000405                              BR      7$              ;GO TO 7$ IF NO ERROR
    016774  000240                              NOP                     ;RETURN HERE IF ERROR
    016776  104000                              EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
    017000  004736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
    017002  000137  017220                      JMP     13$             ;GO TO 13$ IF ERROR
910 017006                              7$:
911
912                                     ;SETUP AND EXECUTE READ HEADER AND DATA COMMAND
```

```
                                                        ;READ HEADER AND DATA
                                                        ;EXTEND REGISTER INDEX TABLE
                                                        ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                                                        ;GO TO 8$ IF NO ERROR
                                                        ;RETURN HERE IF ERROR
                                                        ;ERROR # DEFINED BY PUT SUBROUTINE
                                                        ;GO TO 13$ IF ERROR
                                                        ;WAIT FOR READ COMMAND TO COMPLETE AND READ STATUS
                                                        ;WAIT FOR COMMAND TO COMPLETE
                                                        ;GO READ REGISTER(S) WITH GET SUBROUTINE
                                                        ;GO TO 9$ IF NO ERROR
                                                        ;RETURN HERE IF ERROR
                                                        ;ERROR # DEFINED BY GET SUBROUTINE
                                                        ;GO TO 13$ IF ERROR
                                                        ;CHECK TO SEE IF THIS SECTOR WAS SKIP SECTORED FIRST, IF SO
                                                        ;DO NOT EXECUTE THIS TEST IN 16 BIT FORMAT MODE
                                                        ;IS 'SSE' BIT SET ?
                                                        ;BR IF YES
                                                        ;VERIFY RESULTS OF READ COMMAND
                                                        ;GO CHECK FOR PRIMARY ERRORS
                                                        ;GO TO 10$ IF NO ERROR
                                                        ;RETURN HERE IF ERROR
                                                        ;ERROR # DFFINED BY PRIERR SUBROUTINE
                                                        ;GO BACK FOR MORE ERROR CHECKS
                                                        ;GO TO 13$ IF ERROR
                                                        ;GO VERIFY RESULTS OF DATA TRANSFER
                                                        ;GO TO 11$ IF NO ERROR
                                                        ;RETURN HERE IF ERROR
                                                        ;ERROR # DEFINED BY DTASTS SUBROUTINE
                                                        ;GO BACK FOR MORE ERROR CHECKS
                                                        ;GO TO 13$ IF ERROR
                                                        ;GO CHECK FOR SECONDARY ERRORS
                                                        ;GO TO 12$ IF NO ERROR
                                                        ;RETURN HERE IF ERROR
                                                        ;ERROR # DEFINED BY SECERR SUBROUTINE
                                                        ;GO BACK FOR MORE ERROR CHECKS
                                                        ;GO TO 13$ IF ERROR
                                                        ;TEST 16 BIT MODE W/ SSEI ?
                                                        ;YES !!
                                                        ;TRACK = 2, SECTOR = 31.
                                                        ;SET SSEI BIT IN OFFSET AND
                                                        ;TEST AGAIN
```

```
                        ;;*****************************************************************
                        ;*TEST 13        READ HEADER & DATA W/ MID TRANSFER SEEK
                        ;;*****************************************************************
017220                  TST13:
017220  000004                SCOPE                   ;SCOPE CALL
017222  000240                NOP                     ;START OF TEST
017224  012706  001100        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
017230  013700  001276        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
017234  013701  001466        MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
017240  012737  000013  001226        MOV     #13,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                        ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
017246  013737  001334  001420        MOV     LSTRK,RMDAO     ;START LAST TRACK AND
017254  112737  000036  001420        MOVB    #30.,RMDAO      ;LAST SECTOR
017262  012737  010000  001444        MOV     #FMT16,RMOFO    ;16 BIT FORMAT
017270                  1$:
017270  012737  001057  001446        MOV     #559.,RMDCO     ;CYLINDER = 559.
017276  012737  176774  001414        MOV     #-258.*2,RMWCO  ;WORD COUNT FOR 2 SECTORS (2'S COMP)
017304  012737  101716  001416        MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
017312                  2$:

                        ;PREPARE DEVICE FOR DATA TRANSFER
017312  004737  031456        JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
017316  154130                .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                        ;VERIFY PACK ACKNOWLEDGE
                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                        ;VERIFY RECALIBRATION
017320  000404                BR      3$              ;GO TO 3$ IF NO ERROR
017322  000240                NOP                     ;RETURN HERE IF ERROR
017324  104000                EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
017326  000137  017674        JMP     13$             ;GO TO 13$ IF ERROR
017332                  3$:

                        ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE ON CYLINDER
017332  012737  000005  001412        MOV     #SEEK!GO,RMCS10         ;CHANGE COMMAND TO SEEK
017340  012702  001555        MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
017344  112722  000006        MOVB    #RMDA,(R2)+
017350  112722  000034        MOVB    #RMDC,(R2)
017354  112722  000032        MOVB    #RMOF,(R2)+
017360  112722  000000        MOVB    #RMCS1,(R2)+
017364  112722  000200        MOVB    #200,(R2)+

017370  004737  036004        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
017374  000404                BR      4$              ;GO TO 4$ IF NO ERROR
017376  000240                NOP                     ;RETURN HERE IF ERROR
017400  104000                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
017402  000137  017674        JMP     13$             ;GO TO 13$ IF ERROR
017406                  4$:

                        ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
017406  004737  035450        JSR     PC,GETSTS               ;SETUP FOR STATUS
017412  004737  036356        JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
```

```
                                5$:

                                ;GO READ SEEK STATUS
017416  004737  035534                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
017422  000404                      BR      6$              ;GO TO 6$ IF NO ERROR
017424  000240                      NOP                     ;RETURN HERE IF ERROR
017426  104000                      EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
017430  000137  017674              JMP     13$             ;GO TO 13$ IF ERROR
017434                          6$:

                                ;VERIFY THE RESULTS OF THE SEEK COMMAND
017434  004737  044174              JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
017440  000405                      BR      7$              ;GO TO 7$ IF NO ERROR
017442  000240                      NOP                     ;RETURN HERE IF ERROR
017444  104000                      EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
017446  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
017450  000137  017674              JMP     13$             ;GO TO 13$ IF ERROR
017454                          7$:

                                ;SETUP AND EXECUTE READ HEADER AND DATA COMMAND
017454  012737  000073  001412        MOV     #RH!GO,RMCS10           ;READ HEADER AND DATA
017462  012702  001560                MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
017466  112722  000002                MOVB    #RMWC,(R2)+
017472  112722  000004                MOVB    #RMBA,(R2)+
017476  112722  000000                MOVB    #RMCS1,(R2)+
017502  112722  000200                MOVB    #200,(R2)+

017506  004737  036004              JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
017512  000404                      BR      8$              ;GO TO 8$ IF NO ERROR
017514  000240                      NOP                     ;RETURN HERE IF ERROR
017516  104000                      EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
017520  000137  017674              JMP     13$             ;GO TO 13$ IF ERROR
017524                          8$:

                                ;WAIT FOR READ COMMAND TO COMPLETE AND READ STATUS
017524  004737  036356              JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE

017530  004737  035534              JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
017534  000404                      BR      9$              ;GO TO 9$ IF NO ERROR
017536  000240                      NOP                     ;RETURN HERE IF ERROR
017540  104000                      EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
017542  000137  017674              JMP     13$             ;GO TO 13$ IF ERROR

                                ;CHECK TO SEE IF THIS SECTOR WAS SKIP SECTORED FIRST, IF SO
                                ;DO NOT EXECUTE THIS TEST IN 16 BIT FORMAT MODE
017546                          9$:
017546  032737  000040  001400        BIT     #SSE,RMER2I             ;IS 'SSE' BIT SET ?
017554  001030                      BNE     12$             ;BR IF YES

                                ;VERIFY RESULTS OF READ COMMAND
017556  004737  036552              JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
017562  000405                      BR      10$             ;GO TO 10$ IF NO ERROR
017564  000240                      NOP                     ;RETURN HERE IF ERROR
017566  104000                      EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
017570  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
017572  000137  017674              JMP     13$             ;GO TO 13$ IF ERROR
017576                          10$:
```

```
1014 017576  004737  051612                JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     017602  000405                        BR      11$             ;GO TO 11$ IF NO ERROR
     017604  000240                        NOP                     ;RETURN HERE IF ERROR
     017606  104000                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     017610  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     017612  000137  017674                JMP     13$             ;GO TO 13$ IF FRROR
1015 017616                          11$:
1016 017616  004737  037404                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     017622  000405                        BR      12$             ;GO TO 12$ IF NO ERROR
     017624  000240                        NOP                     ;RETURN HERE IF ERROR
     017626  104000                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     017630  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     017632  000137  017674                JMP     13$             ;GO TO 13$ IF ERROR
1017 017636                          12$:
1018 017636  032737  001000  001444        BIT     #SSEI,RMOFO     ;TEST 16 BIT MODE W/ SSEI SET ?
1019 017644  001013                        BNE     13$             ;YES !!
1020 017646  013737  001334  001420        MOV     LSTRK,RMDAO     ;START LAST TRACK AND
1021 017654  112737  000037  001420        MOVB    #31.,RMDAO      ;LAST SECTOR
1022 017662  052737  001000  001444        BIS     #SSEI,RMOFO     ;SET SSEI IN OFFSET AND
1023 017670  000137  017270                JMP     1$              ;TEST AGAIN.
1024 017674                          13$:
1025
1026                                 ;;*******************************************************************
                                     ;*TEST 14       FORMAT W/ IMPLIED SEEK
                                     ;;*******************************************************************
     017674                          TST14:
     017674  00000.                      SCOPE                   ;SCOPE CALL
     017676  000240                      NOP                     ;START OF TEST
     017700  012706  001100              MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     017704  013700  001276              MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     017710  013701  001466              MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     017714  012737  000014  001226      MOV     #14,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1027
1028                                 ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
1029 017722  012737  001057  001446      MOV     #559.,RMDCO     ;CYLINDER = 559.
1030 017730  012737  001000  001420      MOV     #TA2,RMDAO      ;TRACK = 2, SECTOR = 0
1031 017736  012737  010000  001444      MOV     #FMT16,RMOFO    ;16 BIT FORMAT
1032 017744  012737  176774  001414      MOV     #-258.*2,RMWCO  ;WORD COUNT FOR 2 SECTORS (2'S COMP)
1033 017752  012737  101716  001416      MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
1034 017760  012737  000062  001412      MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA
1035
1036                                 ;VERIFY THAT SECTOR IS NOT BAD
     017766  004737  032406              JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
     017772  000405                      BR      1$              ;GO TO 1$ IF NO ERROR
     017774  104401  063446              TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
     020000  104000                      EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
     020002  000137  020512              JMP     18$             ;GO TO 18$ IF ERROR
1037 020006                          1$:
1038 020006  012737  065116  001174      MOV     #ZEROS,$TMPO            ;USE ALL ZEROS DATA PATTERN
1039 020014  012737  000001  001176      MOV     #1,$TMP1
1040 020022  004737  034640              JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
1041 020026                          2$:
1042
1043                                 ;PREPARE DEVICE FOR DATA TRANSFER
1044 020026  004737  031456              JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     020032  154130                      .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                 ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
```

```
                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                        ;VERIFY PACK ACKNOWLEDGE
                                                        ;RECALIBRATE IF ''SKI'' OR 'PIP'' IS SET
                                                        ;VERIFY RECALIBRATION
020034  000404                    BR      3$              ;GO TO 3$ IF NO ERROR
020036  000240                    NOP                     ;RETURN HERE IF ERROR
020040  104000                    EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
020042  000137  020512            JMP     18$             ;GO TO 18$ IF ERROR
1045 020046                     3$:
1046
1047                            ;SETUP PARAMETERS AND EXECUTE SEEK TO GET DRIVE OFF CYLINDER
1048 020046  013737  001446  020514    MOV     RMDCO,19$               ;SAVE CYLINDER ADDRESS
1049 020054  012737  000000  001446    MOV     #0,RMDCO                ;SEEK TO FIRST CYLINDER
1050 020062  012737  000005  001412    MOV     #SEEK!GO,RMCS10         ;CHANGE COMMAND TO SEEK
1051 020070  012702  001555            MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1052 020074  112722  000006            MOVB    #RMDA,(R2)+
1053 020100  112722  000034            MOVB    #RMDC,(R2)+
1054 020104  112722  000032            MOVB    #RMOF,(R2)+
1055 020110  112722  000000            MOVB    #RMCS1,(R2)+
1056 020114  112722  000200            MOVB    #200,(R2)+
1057
1058 020120  004737  036004            JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
020124  000404                    BR      4$              ;GO TO 4$ IF NO ERROR
020126  000240                    NOP                     ;RETURN HERE IF ERROR
020130  104000                    EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
020132  000137  020512            JMP     18$             ;GO TO 18$ IF ERROR
1059 020136                     4$:
1060
1061                            ;SETUP FOR READING STATUS AND THEN WAIT FOR SEEK TO COMPLETE
1062 020136  004737  035450            JSR     PC,GETSTS               ;SETUP FOR STATUS
1063 020142  004737  036356            JSR     PC,TIMOUT               ;WAIT FOR SEEK TO COMPLETE
1064 020146                     5$:
1065
1066                            ;GO READ SEEK STATUS
1067 020146  004737  035534            JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
020152  000404                    BR      6$              ;GO TO 6$ IF NO ERROR
020154  000240                    NOP                     ;RETURN HERE IF ERROP
020156  104000                    EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
020160  000137  020512            JMP     18$             ;GO TO 18$ IF ERROR
1068 020164                     6$:
1069
1070                            ;VERIFY THE RESULTS OF THE SEEK COMMAND
1071 020164  004737  044174            JSR     PC,SEKSTS       ;GO VERIFY RESULTS OF SEEK OPERATION
020170  000405                    BR      7$              ;GO TO 7$ IF NO ERROR
020172  000240                    NOP                     ;RETURN HERE IF ERROR
020174  104000                    EMT                     ;ERROR # DEFINED BY SEKSTS SUBROUTINE
020176  004736                    JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
020200  000137  020512            JMP     18$             ;GO TO 18$ IF ERROR
1072 020204                     7$:
1073
1074                            ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
1075 020204  013737  020514  001446    MOV     19$,RMDCO               ;RESTORE DISK ADDRESS
1076 020212  012737  000063  001412    MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
1077 020220  012702  001560            MOV     #PUTINX+3,R2            ;EXTEND REGISTER INDEX TABLE
1078 020224  112722  000002            MOVB    #RMWC,(R2)+
```

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1079 020230  112722  000004                    MOVB    #RMBA,(R2)+
1080 020234  112722  000000                    MOVB    #RMCS1,(R2)+
1081 020240  112722  000200                    MOVB    #200,(R2)+
1082
1083 020244  004737  036004                    JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     020250  000404                            BR      8$              ;GO TO 8$ IF NO ERROR
     020252  000240                            NOP                     ;RETURN HERE IF ERROR
     020254  104000                            EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     020256  000137  020512                    JMP     18$             ;GO TO 18$ IF ERROR
1084 020262                            8$:
1085
1086                                   ;WAIT FOR WRITE COMMAND TO COMPLETE AND READ STATUS
1087 020262  004737  036356                    JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1088
1089 020266  004737  035534                    JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     020272  000404                            BR      9$              ;GO TO 9$ IF NO ERROR
     020274  000240                            NOP                     ;RETURN HERE IF ERROR
     020276  104000                            EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     020300  000137  020512                    JMP     18$             ;GO TO 18$ IF ERROR
1090 020304                            9$:
1091
1092                                   ;VERIFY RESULTS OF WRITE COMMAND
1093 020304  004737  036552                    JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     020310  000405                            BR      10$             ;GO TO 10$ IF NO ERROR
     020312  000240                            NOP                     ;RETURN HERE IF ERROR
     020314  104000                            EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     020316  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     020320  000137  020512                    JMP     18$             ;GO TO 18$ IF ERROR
1094 020324                            10$:
1095 020324  004737  051612                    JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     020330  000405                            BR      11$             ;GO TO 11$ IF NO ERROR
     020332  000240                            NOP                     ;RETURN HERE IF ERROR
     020334  104000                            EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     020336  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     020340  000137  020512                    JMP     18$             ;GO TO 18$ IF ERROR
1096 020344                            11$:
1097 020344  004737  037404                    JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     020350  000405                            BR      12$             ;GO TO 12$ IF NO ERROR
     020352  000240                            NOP                     ;RETURN HERE IF ERROR
     020354  104000                            EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     020356  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     020360  000137  020512                    JMP     18$             ;GO TO 18$ IF ERROR
1098 020364                            12$:
1099
1100                                   ;WRITE CHECK HEADER AND DATA FOR SECTORS JUST WRITTEN
1101 020364  012737  000053  001412            MOV     #WCH!GO,RMCS10  ;WRITE CHECK COMMAND
1102
1103 020372  004737  036004                    JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     020376  000404                            BR      13$             ;GO TO 13$ IF NO ERROR
     020400  000240                            NOP                     ;RETURN HERE IF ERROR
     020402  104000                            EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     020404  000137  020512                    JMP     18$             ;GO TO 18$ IF ERROR
1104 020410                            13$:
1105
1106                                   ;WAIT FOR WRITE CHECK TO COMPLETE AND GET STATUS
1107 020410  004737  036356                    JSR     PC,TIMOUT               ;WAIT FOR WRITE CHECK TO FINISH
1108
```

```
1109 020414  004737  035534                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     020420  000404                        BR      14$             ;GO TO 14$ IF NO ERROR
     020422  000240                        NOP                     ;RETURN HERE IF ERROR
     020424  104000                        EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     020426  000137  020512                JMP     18$             ;GO TO 18$ IF ERROR
1110 020432                          14$:
1111
1112                                 ;VERIFY THE RESULTS OF WRITE CHECK OPERATION
1113 020432  004737  036552                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     020436  000405                        BR      15$             ;GO TO 15$ IF NO ERROR
     020440  000240                        NOP                     ;RETURN HERE IF ERROR
     020442  104000                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     020444  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     020446  000137  020512                JMP     18$             ;GO TO 18$ IF ERROR
1114 020452                          15$:
1115 020452  004737  051612                JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     020456  000405                        BR      16$             ;GO TO 16$ IF NO ERROR
     020460  000240                        NOP                     ;RETURN HERE IF ERROR
     020462  104000                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     020464  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     020466  000137  020512                JMP     18$             ;GO TO 18$ IF ERROR
1116 020472                          16$:
1117 020472  004737  037404                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     020476  000405                        BR      17$             ;GO TO 17$ IF NO ERROR
     020500  000240                        NOP                     ;RETURN HERE IF ERROR
     020502  104000                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     020504  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     020506  000137  020512                JMP     18$             ;GO TO 18$ IF ERROR
1118 020512                          17$:
1119
1120 020512  000401                  18$:  BR      20$
1121
1122 020514  000000                  19$:  .WORD   0                       ;TEMPORARY STORAGE
1123
1124 020516                          20$:
1125
1126                                 ;;*****************************************************************
                                     ;*TEST 15       FORMAT EACH SECTOR ADDRESS
                                     ;;*****************************************************************
     020516                          TST15:
     020516  000004                        SCOPE                   ;SCOPE CALL
     020520  000240                        NOP                     ;START OF TEST
     020522  012706  001100                MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     020526  013700  001276                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     020532  013701  001466                MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     020536  012737  000015  001226        MOV     #15,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1127
1128                                 ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
1129 020544  012737  001057  001446        MOV     #559.,RMDC0             ;CYLINDER = 559.
1130 020552  012737  001000  001420        MOV     #TA2,RMDA0              ;TRACK = 2, SECTOR = 0
1131 020560  012737  011000  001444        MOV     #FMT16!SSEI,RMOF0       ;16 BIT FORMAT
1132 020566                          1$:
1133 020566  012737  177376  001414        MOV     #-258.,RMWC0            ;2 + 256 WORDS (2'S COMP)
1134 020574  012737  101716  001416        MOV     #BUFONE,RMBA0           ;DATA BUFFER ADDRESS
1135 020602  012737  000062  001412        MOV     #WH,RMCS10              ;WRITE HEADER AND DATA
1136
1137                                 ;VERIFY THAT SECTOR IS NOT BAD
```

```
020610  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
020614  000405                          BR      2$              ;GO TO 2$ IF NO ERROR
020616  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
020622  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
020624  000137  021260                  JMP     16$             ;GO TO 16$ IF ERROR
1138 020630                     2$:
1139 020630  012737  001420  001174      MOV     #RMDA0,$TMP0            ;USE SECTOR FOR DATA PATTERN
1140 020636  012737  000001  001176      MOV     #1,$TMP1
1141 020644  004737  034640              JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
1142 020650                     3$:
1143
1144                            ;PREPARE DEVICE FOR DATA TRANSFER
1145 020650  004737  031456              JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
020654  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                ;CLEAR CONTROLLER & SELECT DEVICE
                                                                ;VERIFY CONTROLLER CLEAR OPERATION
                                                                ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                ;VERIFY PACK ACKNOWLEDGE
                                                                ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                ;VERIFY RECALIBRATION
020656  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
020660  000240                          NOP                     ;RETURN HERE IF ERROR
020662  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
020664  000137  021260                  JMP     16$             ;GO TO 16$ IF ERROR
1146 020670                     4$:
1147
1148                            ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
1149 020670  012737  000063  001412      MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
1150 020676  012702  001555              MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1151 020702  112722  000006              MOVB    #RMDA,(R2)+
1152 020706  112722  000034              MOVB    #RMDC,(R2)+
1153 020712  112722  000032              MOVB    #RMOF,(R2)+
1154 020716  112722  000002              MOVB    #RMWC,(R2)+
1155 020722  112722  000004              MOVB    #RMBA,(R2)+
1156 020726  112722  000000              MOVB    #RMCS1,(R2)+
1157 020732  112722  000200              MOVB    #200,(R2)+
1158
1159 020736  004737  036004              JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
020742  000404                          BR      5$              ;GO TO 5$ IF NO ERROR
020744  000240                          NOP                     ;RETURN HERE IF ERROR
020746  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
020750  000137  021260                  JMP     16$             ;GO TO 16$ IF ERROR
1160 020754                     5$:
1161
1162                            ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1163 020754  004737  035450              JSR     PC,GETSTS
1164 020760  004737  036356              JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1165
1166 020764  004737  035534              JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
020770  000404                          BR      6$              ;GO TO 6$ IF NO ERROR
020772  000240                          NOP                     ;RETURN HERE IF ERROR
020774  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
020776  000137  021260                  JMP     16$             ;GO TO 16$ IF ERROR
1167 021002                     6$:
1168
1169                            ;VERIFY RESULTS OF WRITE COMMAND
```

```
1170 021002  004737  036552                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     021006  000405                        BR      7$              ;GO TO 7$ IF NO ERROR
     021010  000240                        NOP                     ;RETURN HERE IF ERROR
     021012  104000                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     021014  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     021016  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
1171 021022                          7$:
1172 021022  004737  051612                JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     021026  000405                        BR      8$              ;GO TO 8$ IF NO ERROR
     021030  000240                        NOP                     ;RETURN HERE IF ERROR
     021032  104000                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     021034  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     021036  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
1173 021042                          8$:
1174 021042  004737  037404                JSR     PC,SECFRR       ;GO CHECK FOR SECONDARY ERRORS
     021046  000405                        BR      9$              ;GO TO 9$ IF NO ERROR
     021050  000240                        NOP                     ;RETURN HERE IF ERROR
     021052  104000                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     021054  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     021056  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
1175 021062                          9$:
1176
1177                                 ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
1178 021062  012737  000073  001412        MOV     #RH!GO,RMCS1O           ;READ HEADER & DATA COMMAND
1179 021070  012737  102722  001416        MOV     #BUFTWO,RMBAO           ;CHANGE BUS ADDRESS
1180
1181 021076  004737  036004                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     021102  000404                        BR      10$             ;GO TO 10$ IF NO ERROR
     021104  000240                        NOP                     ;RETURN HERE IF ERROR
     021106  104000                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     021110  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
1182 021114                          10$:
1183
1184                                 ;WAIT FOR READ TO COMPLETE AND GET STATUS
1185 021114  004737  036356                JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
1186
1187 021120  004737  035534                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     021124  000404                        BR      11$             ;GO TO 11$ IF NO ERROR
     021126  000240                        NOP                     ;RETURN HERE IF ERROR
     021130  104000                        EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     021132  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
1188 021136                          11$:
1189
1190                                 ;VERIFY THE RESULTS OF READ OPERATION
1191 021136  004737  036552                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     021142  000405                        BR      12$             ;GO TO 12$ IF NO ERROR
     021144  000240                        NOP                     ;RETURN HERE IF ERROR
     021146  104000                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     021150  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     021152  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
1192 021156                          12$:
1193 021156  004737  051612                JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     021162  000405                        BR      13$             ;GO TO 13$ IF NO ERROR
     021164  000240                        NOP                     ;RETURN HERE IF ERROR
     021166  104000                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     021170  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     021172  000137  021260                JMP     16$             ;GO TO 16$ IF ERROR
```

```
 1194 021176
 1195 021176  004737  037404                 13$:
      021202  000405                                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
      021204  000240                                BR      14$             ;GO TO 14$ IF NO ERROR
      021206  104000                                NOP                     ;RETURN HERE IF ERROR
      021210  004736                                EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
      021212  000137  021260                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
 1196 021216                                        JMP     16$             ;GO TO 16$ IF ERROR
 1197                                       14$:
 1198                                       ;VERIFY DATA
 1199 021216  004737  035106                        JSR     PC,CMPBUF       ;GO COMPARE WRITE, READ DATA BUFFERS
      021222  101716                                .WORD   BUFONE          ;STARTING ADDRESS OF WRITE BUFFER
      021224  102722                                .WORD   BUFTWO          ;STARTING ADDRESS OF READ BUFFER
      021226  000404                                BR      15$             ;GO TO 15$ IF NO ERROR
      021230  000240                                NOP                     ;RETURN HERE IF ERROR
      021232  104000                                EMT                     ;ERROR # DEFINED BY CMPBUF SUBROUTINE
      021234  000137  021260                        JMP     16$             ;GO TO 16$ IF ERROR
 1200
 1201                                       ;INCREMENT ADDRESS AND FORMAT NEXT SECTOR
 1202 021240                                15$:
 1203 021240  005237  001420                        INC     RMDAO           ;ADVANCE SECTOR COUNT
 1204 021244  122737  000037  001420                CMPB    #31.,RMDAO      ;DONE ALL SECTORS??
 1205 021252  103402                                BLO     16$             ;YES!!
 1206 021254  000137  020566                        JMP     1$              ;GO DO NEXT SECTOR
 1207 021260                                16$:
 1208
 1209                                       ;;*****************************************************************
                                            ;*TEST 16       FORMAT EACH TRACK ADDRESS
                                            ;;*****************************************************************
      021260                                ;
      021260  000004                        TST16:
      021262  000240                                SCOPE                   ;SCOPE CALL
      021264  012706  001100                        NOP                     ;START OF TEST
      021270  013700  001276                        MOV     #STACK,SP       ;INITIALIZE STACK POINTER
      021274  013701  001466                        MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
      021300  012737  000016  0C1226                MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
 1210                                           MOV     #16,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 1211                                       ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
 1212 021306  012737  001060  001446                MOV     #560.,RMDCO     ;CYLINDER = 560.
 1213 021314  012737  000000  001420                MOV     #0,RMDAO        ;TRACK = 0, SECTOR = 0
 1214 021322  012737  010000  001444                MOV     #FMT16,RMOFO    ;16 BIT FORMAT
 1215 021330                                1$:
 1216 021330  012737  177376  001414                MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
 1217 021336  012737  101716  001416                MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
 1218 021344  012737  000062  001412                MOV     #WH,RMCS1O      ;WRITE HEADER AND DATA
 1219
 1220                                       ;VERIFY THAT SECTOR IS NOT BAD
      021352  004737  032406                        JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
      021356  000405                                BR      2$              ;GO TO 2$ IF NO ERROR
      021360  104401  063446                        TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
      021364  104000                                EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
      021366  000137  022022                        JMP     16$             ;GO TO 16$ IF ERROR
 1221 021372                                2$:
 1222 021372  012737  001420  001174                MOV     #RMDAO,$TMP0    ;USE TRACK FOR DATA PATTERN
 1223 021400  012737  000001  001176                MOV     #1,$TMP1
 1224 021406  004737  034640                        JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
 1225 021412                                3$:
```

```
1226
1227                                    ;PREPARE DEVICE FOR DATA TRANSFER
1228 021412  004737  031456                      JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     021416  154130                              .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                        ;VERIFY RECALIBRATION
     021420  000404                              BR      4$              ;GO TO 4$ IF NO ERROR
     021422  000240                              NOP                     ;RETURN HERE IF ERROR
     021424  104000                              EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     021426  000137  022022                      JMP     16$             ;GO TO 16$ IF ERROR
1229 021432                             4$:
1230
1231                                    ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
1232 021432  012737  000063  001412              MOV     #WH!GO,RMCS1D           ;WRITE HEADER AND DATA
1233 021440  012702  001555                      MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1234 021444  112722  000006                      MOVB    #RMDA,(R2)+
1235 021450  112722  000034                      MOVB    #RMDC,(R2)+
1236 021454  112722  000032                      MOVB    #RMOF,(R2)+
1237 021460  112722  000002                      MOVB    #RMWC,(R2)+
1238 021464  112722  000004                      MOVB    #RMBA,(R2)+
1239 021470  112722  000000                      MOVB    #RMCS1,(R2)+
1240 021474  112722  000200                      MOVB    #200,(R2)+
1241
1242 021500  004737  036004                      JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     021504  000404                              BR      5$              ;GO TO 5$ IF NO ERROR
     021506  000240                              NOP                     ;RETURN HERE IF ERROR
     021510  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     021512  000137  022022                      JMP     16$             ;GO TO 16$ IF ERROR
1243 021516                             5$:
1244
1245                                    ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1246 021516  004737  035450                      JSR     PC,GETSTS
1247 021522  004737  036356                      JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1248
1249 021526  004737  035534                      JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     021532  000404                              BR      6$              ;GO TO 6$ IF NO ERROR
     021534  000240                              NOP                     ;RETURN HERE IF ERROR
     021536  104000                              EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     021540  000137  022022                      JMP     16$             ;GO TO 16$ IF ERROR
1250 021544                             6$:
1251
1252
1253 021544  004737  036552                      JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     021550  000405                              BR      7$              ;GO TO 7$ IF NO ERROR
     021552  000240                              NOP                     ;RETURN HERE IF ERROR
     021554  104000                              EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     021556  004736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     021560  000137  022022                      JMP     16$             ;GO TO 16$ IF ERROR
1254 021564                             7$:
1255 021564  004737  051612                      JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     021570  000405                              BR      8$              ;GO TO 8$ IF NO ERROR
     021572  000240                              NOP                     ;RETURN HERE IF ERROR
```

```
                021574  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
                021576  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                021600  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1256         021604                          8$:
   1257         021604  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
                021610  000405                          BR      9$              ;GO TO 9$ IF NO ERROR
                021612  000240                          NOP                     ;RETURN HERE IF ERROR
                021614  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
                021616  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                021620  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1258         021624                          9$:
   1259
   1260                                         ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
   1261         021624  012737  000073  001412          MOV     #RH!GO,RMCS1O           ;READ HEADER & DATA COMMAND
   1262         021632  012737  102722  001416          MOV     #BUFTWO,RMBAO           ;CHANGE BUS ADDRESS
   1263
   1264         021640  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                021644  000404                          BR      10$             ;GO TO 10$ IF NO ERROR
                021646  000240                          NOP                     ;RETURN HERE IF ERROR
                021650  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                021652  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1265         021656                          10$:
   1266
   1267                                         ;WAIT FOR READ TO COMPLETE AND GET STATUS
   1268         021656  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
   1269
   1270         021662  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
                021666  000404                          BR      11$             ;GO TO 11$ IF NO ERROR
                021670  000240                          NOP                     ;RETURN HERE IF ERROR
                021672  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
                021674  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1271         021700                          11$:
   1272
   1273                                         ;VERIFY THE RESULTS OF READ OPERATION
   1274         021700  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
                021704  000405                          BR      12$             ;GO TO 12$ IF NO ERROR
                021706  000240                          NOP                     ;RETURN HERE IF ERROR
                021710  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
                021712  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                021714  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1275         021720                          12$:
   1276         021720  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
                021724  000405                          BR      13$             ;GO TO 13$ IF NO ERROR
                021726  000240                          NOP                     ;RETURN HERE IF ERROR
                021730  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
                021732  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                021734  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1277         021740                          13$:
   1278         021740  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
                021744  000405                          BR      14$             ;GO TO 14$ IF NO ERROR
                021746  000240                          NOP                     ;RETURN HERE IF ERROR
                021750  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
                021752  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                021754  000137  022022                  JMP     16$             ;GO TO 16$ IF ERROR
   1279         021760                          14$:
   1280
   1281                                         ;VERIFY DATA
```

```
1282 021760  004737  035106                JSR     PC,CMPBUF       ;GO COMPARE WRITE, READ DATA BUFFERS
     021764  101716                        .WORD   BUFONE          ;STARTING ADDRESS OF WRITE BUFFER
     021766  102722                        .WORD   BUFTWO          ;STARTING ADDRESS OF READ BUFFER
     021770  000404                        BR      15$             ;GO TO 15$ IF NO ERROR
     021772  000240                        NOP                     ;RETURN HERE IF ERROR
     021774  104000                        EMT                     ;ERROR # DEFINED BY CMPBUF SUBROUTINE
     021776  000137  022022                JMP     16$             ;GO TO 16$ IF ERROR
1283
1284                                  ;INCREMENT ADDRESS AND FORMAT NEXT TRACK
1285 022002                           15$:
1286 022002  105237  001421                INCB    RMDAO+1                 ;ADVANCE TRACK COUNT
1287 022006  123737  001421  001335        CMPB    RMDAO+1,LSTRK+1         ;LAST TRACK ?
1288 022014  101002                        BHI     16$                     ;YES!!
1289 022016  000137  021330                JMP     1$                      ;GO DO NEXT SECTOR
1290 022022                           16$:
1291
1292                                  ;;*****************************************************************
                                      ;*TEST 17        READ HEADER & DATA IN LAST SECTOR
                                      ;;*****************************************************************
     022022                           TST17:
     022022  000004                        SCOPE                   ;SCOPE CALL
     022024  000240                        NOP                     ;START OF TEST
     022026  012706  001100                MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     022032  013700  001276                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     022036  013701  001466                MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     022042  012737  000017  001226        MOV     #17,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1293
1294                                  ;SETUP PARAMETERS FOR READING LAST SECTOR
1295 022050  013737  001334  001420        MOV     LSTRK,RMDAO     ;SET LAST TRACK AND
1296 022056  112737  000036  001420        MOVB    #30.,RMDAO      ;LAST SECTOR
1297 022064  012737  010000  001444        MOV     #FMT16,RMOFO    ;16 BIT FORMAT
1298 022072                           1$:
1299 022072  012737  001060  001446        MOV     #560.,RMDCO     ;LAST CYLINDER
1300 022100  012737  177376  001414        MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
1301 022106  012737  102722  001416        MOV     #BUFTWO,RMBAO   ;DATA BUFFER ADDRESS
1302 022114  012737  000073  001412        MOV     #RH!GO,RMCS1O   ;READ HEADER AND DATA
1303
1304                                  ;PREPARE DEVICE FOR DATA TRANSFER
1305 022122  004737  031456                JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     022126  154130                        .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                    ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                    ;CLEAR CONTROLLER & SELECT DEVICE
                                                                    ;VERIFY CONTROLLER CLEAR OPERATION
                                                                    ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                    ;VERIFY PACK ACKNOWLEDGE
                                                                    ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                    ;VERIFY RECALIBRATION
     022130  000404                        BR      2$              ;GO TO 2$ IF NO ERROR
     022132  000240                        NOP                     ;RETURN HERE IF EPROR
     022134  104000                        EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     022136  000137  022374                JMP     9$              ;GO TO 9$ IF ERROR
1306 022142                           2$:
1307 022142  012702  001555                MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1308 022146  112722  000006                MOVB    #RMDA,(R2)+
1309 022152  112722  000034                MOVB    #RMDC,(R2)+
1310 022156  112722  000032                MOVB    #RMOF,(R2)+
1311 022162  112722  000004                MOVB    #RMBA,(R2)+
```

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 1312 022166  112722  000002                    MOVB    #RMWC,(R2)+
 1313 022172  112722  000000                    MOVB    #RMCS1,(R2)+
 1314 022176  112722  000200                    MOVB    #200,(R2)+              ;TERMINATOR
 1315 022202                              3$:
 1316
 1317                                     ;READ HEADER AND DATA OF LAST SECTOR
 1318 022202  004737  036004                    JSR     PC,PUT                  ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
      022206  000404                            BR      4$                      ;GO TO 4$ IF NO ERROR
      022210  000240                            NOP                             ;RETURN HERE IF ERROR
      022212  104000                            EMT                             ;ERROR # DEFINED BY PUT SUBROUTINE
      022214  000137  022374                    JMP     9$                      ;GO TO 9$ IF ERROR
 1319 022220                              4$:
 1320
 1321                                     ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
 1322 022220  004737  035450                    JSR     PC,GETSTS
 1323 022224  004737  036356                    JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
 1324
 1325 022230  004737  035534                    JSR     PC,GET                  ;GO READ REGISTER(S) WITH GET SUBROUTINE
      022234  000404                            BR      5$                      ;GO TO 5$ IF NO ERROR
      022236  000240                            NOP                             ;RETURN HERE IF ERROR
      022240  104000                            EMT                             ;ERROR # DEFINED BY GET SUBROUTINE
      022242  000137  022374                    JMP     9$                      ;GO TO 9$ IF ERROR
 1326
 1327                                     ;CHECK TO SEE IF THIS SECTOR WAS SKIP SECTORED FIRST, IF SO
 1328                                     ;DO NOT EXECUTE THIS TEST IN 16 BIT FORMAT MODE
 1329 022246                              5$:
 1330 022246  032737  000040  001400            BIT     #SSE,RMER2I             ;IS 'SSE' BIT SET ?
 1331 022254  001030                            BNE     8$                      ;BR IF YES
 1332
 1333                                     ;VERIFY THE RESULTS OF READ OPERATION
 1334 022256  004737  036552                    JSR     PC,PRIERR               ;GO CHECK FOR PRIMARY ERRORS
      022262  000405                            BR      6$                      ;GO TO 6$ IF NO ERROR
      022264  000240                            NOP                             ;RETURN HERE IF ERROR
      022266  104000                            EMT                             ;ERROR # DEFINED BY PRIERR SUBROUTINE
      022270  004736                            JSR     PC,@(SP)+               ;GO BACK FOR MORE ERROR CHECKS
      022272  000137  022374                    JMP     9$                      ;GO TO 9$ IF ERROR
 1335 022276                              6$:
 1336 022276  004737  051612                    JSR     PC,DTASTS               ;GO VERIFY RESULTS OF DATA TRANSFER
      022302  000405                            BR      7$                      ;GO TO 7$ IF NO ERROR
      022304  000240                            NOP                             ;RETURN HERE IF ERROR
      022306  104000                            EMT                             ;ERROR # DEFINED BY DTASTS SUBROUTINE
      022310  004736                            JSR     PC,@(SP)+               ;GO BACK FOR MORE ERROR CHECKS
      022312  000137  022374                    JMP     9$                      ;GO TO 9$ IF ERROR
 1337 022316                              7$:
 1338 022316  004737  037404                    JSR     PC,SECERR               ;GO CHECK FOR SECONDARY ERRORS
      022322  000405                            BR      8$                      ;GO TO 8$ IF NO ERROR
      022324  000240                            NOP                             ;RETURN HERE IF ERROR
      022326  104000                            EMT                             ;ERROR # DEFINED BY SECERR SUBROUTINE
      022330  004736                            JSR     PC,@(SP)+               ;GO BACK FOR MORE ERROR CHECKS
      022332  000137  022374                    JMP     9$                      ;GO TO 9$ IF ERROR
 1339 022336                              8$:
 1340 022336  032737  001000  001444            BIT     #SSEI,RMOFO             ;TEST 16 BIT MODE W/ SSEI SET ?
 1341 022344  001013                            BNE     9$                      ;YES !!
 1342 022346  013737  001334  001420            MOV     LSTRK,RMDAO             ;SET LAST TRACK AND
 1343 022354  112737  000037  001420            MOVB    #31.,RMDAO              ;LAST SECTOR
 1344 022362  052737  001000  001444            BIS     #SSEI,RMOFO             ;SET SSEI BIT IN OFFSET AND
 1345 022370  000137  022072                    JMP     1$                      ;TEST AGAIN.
```

```
1346 022374                                    9$:
1347
1348                                           ;;*****************************************************************
                                               ;*TEST 20       READ HEADER & DATA W/ AOE ERROR
                                               ;;*****************************************************************
     022374                                    TST20:
     022374  000004                                  SCOPE                   ;SCOPE CALL
     022376  000240                                  NOP                     ;START OF TEST
     022400  012706  001100                          MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     022404  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     022410  013701  001466                          MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     022414  012737  000020  001226                  MOV     #20,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1349
1350                                           ;SETUP PARAMETERS FOR READING 2 SECTORS STARTING WITH LAST SECTOR
1351 022422  013737  001334  001420                MOV     LSTRK,RMDA0     ;SET LAST TRACK AND
1352 022430  112737  000036  001420                MOVB    #30.,RMDA0      ;LAST SECTOR
1353 022436  012737  010000  001444                MOV     #FMT16,RMOF0    ;16 BIT FORMAT
1354 022444                                    1$:
1355 022444  012737  001060  001446                MOV     #560.,RMDC0     ;LAST CYLINDER
1356 022452  012737  176774  001414                MOV     #-258.*2,RMWC0  ;READ 2 SECTORS
1357 022460  012737  102722  001416                MOV     #BUFTWO,RMBA0   ;DATA BUFFER ADDRESS
1358 022466  012737  000073  001412                MOV     #RH!GO,RMCS10   ;READ HEADER AND DATA
1359
1360                                           ;PREPARE DEVICE FOR DATA TRANSFER
1361 022474  004737  031456                        JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     022500  154130                                .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                           ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                           ;CLEAR CONTROLLER & SELECT DEVICE
                                                                           ;VERIFY CONTROLLER CLEAR OPERATION
                                                                           ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                           ;VERIFY PACK ACKNOWLEDGE
                                                                           ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                           ;VERIFY RECALIBRATION
     022502  000404                                BR      2$              ;GO TO 2$ IF NO ERROR
     022504  000240                                NOP                     ;RETURN HERE IF ERROR
     022506  104000                                EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     022510  000137  022746                        JMP     8$              ;GO TO 8$ IF ERROR
1362 022514                                    2$:
1363 022514  012702  001555                        MOV     #PUTINX,R2      ;WRITE REGISTER INDEX TABLE
1364 022520  112722  000006                        MOVB    #RMDA,(R2)+
1365 022524  112722  000034                        MOVB    #RMDC,(R2)+
1366 022530  112722  000032                        MOVB    #RMOF,(R2)+
1367 022534  112722  000002                        MOVB    #RMWC,(R2)+
1368 022540  112722  000004                        MOVB    #RMBA,(R2)+
1369 022544  112722  000000                        MOVB    #RMCS1,(R2)+
1370 022550  112722  000200                        MOVB    #200,(R2)+
1371
1372 022554  004737  036004                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     022560  000404                                BR      3$              ;GO TO 3$ IF NO ERROR
     022562  000240                                NOP                     ;RETURN HERE IF ERROR
     022564  104000                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     022566  000137  022746                        JMP     8$              ;GO TO 8$ IF ERROR
1373 022572                                    3$:
1374
1375                                           ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1376 022572  004737  035450                        JSR     PC,GETSTS
1377 022576  004737  036356                        JSR     PC,TIMOUT       ;WAIT FOR READ TO COMPLETE
```

```
1378
1379 022602  004737  035534                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     022606  000404                        BR      4$              ;GO TO 4$ IF NO ERROR
     022610  000240                        NOP                     ;RETURN HERE IF ERROR
     022612  104000                        EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     022614  000137  022746                JMP     8$              ;GO TO 8$ IF ERROR
1380
1381                                ;CHECK TO SEE IF THIS SECTOR WAS SKIP SECTORED FIRST, IF SO
1382                                ;DO NOT EXECUTE THIS TEST IN 16 BIT FORMAT MODE
1383 022620                        4$:
1384 022620  032737  000040  001400        BIT     #SSE,RMER2I             ;IS 'SSE' BIT SET ?
1385 022626  001030                        BNE     7$                      ;BR IF YES
1386
1387                                ;VERIFY THE RESULTS OF READ OPERATION
1388 022630  004737  036552                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     022634  000405                        BR      5$              ;GO TO 5$ IF NO ERROR
     022636  000240                        NOP                     ;RETURN HERE IF ERROR
     022640  104000                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     022642  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     022644  000137  022746                JMP     8$              ;GO TO 8$ IF ERROR
1389 022650                        5$:
1390 022650  004737  051612                JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     022654  000405                        BR      6$              ;GO TO 6$ IF NO ERROR
     022656  000240                        NOP                     ;RETURN HERE IF ERROR
     022660  104000                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     022662  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     022664  000137  022746                JMP     8$              ;GO TO 8$ IF ERROR
1391 022670                        6$:
1392 022670  004737  037404                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     022674  000405                        BR      7$              ;GO TO 7$ IF NO ERROR
     022676  000240                        NOP                     ;RETURN HERE IF ERROR
     022700  104000                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     022702  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     022704  000137  022746                JMP     8$              ;GO TO 8$ IF ERROR
1393 022710                        7$:
1394 022710  032737  001000  001444        BIT     #SSEI,RMOFO     ;TEST 16 BIT MODE W/ SSEI SET ?
1395 022716  001013                        BNE     8$              ;YES !!
1396 022720  013737  001334  001420        MOV     LSTRK,RMDAO     ;SET LAST TRACK AND
1397 022726  112737  000037  001420        MOVB    #31.,RMDAO      ;LAST SECTOR
1398 022734  052737  001000  001444        BIS     #SSEI,RMOFO     ;SET SSEI BIT IN OFFSET AND
1399 022742  000137  022444                JMP     1$              ;TEST AGAIN.
1400 022746                        8$:
1401
1402                                ;;**^*^*****************************************************************
                                    ;*TEST 21       READ INVALID SECTOR ADDRESS
                                    ;;*************************************************************************
     022746                         TST21:
     022746  000004                        SCOPE                   ;SCOPE CALL
     022750  000240                        NOP                     ;START OF TEST
     022752  012706  001100                MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     022756  013700  001276                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     022762  013701  001466                MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     022766  012737  000021  001226        MOV     #21,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1403
1404 022774  012737  001057  001446        MOV     #559.,RMDCO     ;CYLINDER = 559.
1405 023002  012737  001036  001420        MOV     #^A2!30.,RMDAO  ;TRACK = 2, INVALID SECTOR = 30.
1406 023010  012737  000000  001444        MOV     #0,RMOFO        ;18 BIT FORMAT
```

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1407 023016  012737  177376  001414          MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
1408 023024  012737  101716  001416          MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
1409 023032  012737  000073  001412          MOV     #RH!GO,RMCS1O   ;READ HEADER AND DATA
1410 023040                              1$:
1411
1412                                     ;PREPARE DEVICE FOR DATA TRANSFER
1413 023040  004737  031456                      JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     023044  154130                              .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                         ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                         ;CLEAR CONTROLLER & SELECT DEVICE
                                                                         ;VERIFY CONTROLLER CLEAR OPERATION
                                                                         ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                         ;VERIFY PACK ACKNOWLEDGE
                                                                         ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                         ;VERIFY RECALIBRATION
     023046  000404                              BR      2$              ;GO TO 2$ IF NO ERROR
     023050  000240                              NOP                     ;RETURN HERE IF ERROR
     023052  104000                              EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     023054  000137  023310                      JMP     9$              ;GO TO 9$ IF ERROR
1414 023060                              2$:
1415
1416                                     ;SETUP AND EXECUTE READ HEADER AND DATA COMMAND
1417 023060  012702  001555                      MOV     #PUTINX,R2      ;LOAD REGISTER INDEX TABLE
1418 023064  112722  000006                      MOVB    #RMDA,(R2)+
1419 023070  112722  000034                      MOVB    #RMDC,(R2)+
1420 023074  112722  000032                      MOVB    #RMOF,(R2)+
1421 023100  112722  000002                      MOVB    #RMWC,(R2)+
1422 023104  112722  000004                      MOVB    #RMBA,(R2)+
1423 023110  112722  000000                      MOVB    #RMCS1,(R2)+
1424 023114  112722  000200                      MOVB    #200,(R2)+      ;SET TERMINATOR BYTE
1425
1426 023120  004737  036004                      JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     023124  000404                              BR      3$              ;GO TO 3$ IF NO ERROR
     023126  000240                              NOP                     ;RETURN HERE IF ERROR
     023130  104000                              EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     023132  000137  023310                      JMP     9$              ;GO TO 9$ IF ERROR
1427 023136                              3$:
1428
1429                                     ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1430 023136  004737  035450                      JSR     PC,GETSTS
1431 023142  004737  036356                      JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1432
1433 023146  004737  035534                      JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     023152  000404                              BR      4$              ;GO TO 4$ IF NO ERROR
     023154  000240                              NOP                     ;RETURN HERE IF ERROR
     023156  104000                              EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     023160  000137  023310                      JMP     9$              ;GO TO 9$ IF ERROR
1434 023164                              4$:
1435
1436                                     ;VERIFY RESULTS OF READ COMMAND
1437 023164  004737  036552                      JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     023170  000405                              BR      5$              ;GO TO 5$ IF NO ERROR
     023172  000240                              NOP                     ;RETURN HERE IF ERROR
     023174  104000                              EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     023176  0C4736                              JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     023200  000137  023310                      JMP     9$              ;GO TO 9$ IF ERROR
1438 023204                              5$:
```

```
1439 023204  004737  051612              JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     023210  000405                      BR      6$              ;GO TO 6$ IF NO ERROR
     023212  000240                      NOP                     ;RETURN HERE IF ERROR
     023214  104000                      EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     023216  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     023220  000137  023310              JMP     9$              ;GO TO 9$ IF ERROR
1440 023224                         6$:
1441 023224  004737  037404              JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     023230  000405                      BR      7$              ;GO TO 7$ IF NO ERROR
     023232  000240                      NOP                     ;RETURN HERE IF ERROR
     023234  104000                      EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     023236  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     023240  000137  023310              JMP     9$              ;GO TO 9$ IF ERROR
1442 023244                         7$:
1443
1444                                ;INCREMENT ADDRESS AND FORMAT NEXT SECTOR
1445 023244  005237  001420              INC     RMDAO                   ;ADVANCE SECTOR COUNT
1446 023250  023727  001420  000100      CMP     RMDAO,#64.              ;DONE YET ?
1447 023256  101412                      BLOS    8$                      ;NO - TEST NEXT SECTOR
1448
1449 023260  032737  010000  001444      BIT     #FMT16,RMOFO            ;TEST 16 BIT MODE YET ?
1450 023266  001010                      BNE     9$                      ;YES !!
1451 023270  012737  001037  001420      MOV     #TA2!31.,RMDAO          ;TRACK = 2, INVALID SECTOR = 31.
1452 023276  012737  010000  001444      MOV     #FMT16,RMOFO            ;SET 16 BIT MODE IN OFFSET AND
1453 023304  000137  023040         8$:  JMP     1$                      ;TEST AGAIN.
1454
1455 023310                         9$:
1456
1457                                ;;*****************************************************************
                                    ;*TEST 22       READ INVALID TRACK ADDRESS
                                    ;;*****************************************************************
     023310                         TST22:
     023310  000004                      SCOPE                   ;SCOPE CALL
     023312  000240                      NOP                     ;START OF TEST
     023314  012706  001100              MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     023320  013700  001276              MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     023324  013701  001466              MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     023330  012737  000022  001226      MOV     #22,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1458
1459 023336  012737  001057  001446      MOV     #559.,RMDCO     ;CYLINDER = 559.
1460 023344  013737  001334  001420      MOV     LSTRK,RMDAO     ;LOAD LAST TRACK, SECTOR = 0
1461 023352  105237  001421              INCB    RMDAO+1         ;INCREMENT TO FIRST INVALID TRACK
1462 023356  012737  010000  001444      MOV     #FMT16,RMOFO    ;16 BIT FORMAT
1463 023364  012737  177376  001414      MOV     #-258.,RMWCO    ;2 + 256 WORDS (2'S COMP)
1464 023372  012737  101716  001416      MOV     #BUFONE,RMBAO   ;DATA BUFFER ADDRESS
1465 023400  012737  000073  001412      MOV     #RH!GO,RMCS10   ;READ HEADER AND DATA
1466 023406                         1$:
1467
1468                                ;PREPARE DEVICE FOR DATA TRANSFER
1469 023406  004737  031456              JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     023412  154130                      .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                 ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                 ;CLEAR CONTROLLER & SELECT DEVICE
                                                                 ;VERIFY CONTROLLER CLEAR OPERATION
                                                                 ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                 ;VERIFY PACK ACKNOWLEDGE
                                                                 ;RECALIBRATE IF "SKI" OR "PIP" IS SET
```

```
                                                                ;VERIFY RECALIBRATION
        023414  000404                          BR      2$      ;GO TO 2$ IF NO ERROR
        023416  000240                          NOP             ;RETURN HERE IF ERROR
        023420  104000                          EMT             ;ERROR # DEFINED BY TSTPRP SUBROUTINE
        023422  000137  023632                  JMP     8$      ;GO TO 8$ IF ERROR
1470    023426                          2$:
1471
1472                                    ;SETUP AND EXECUTE READ HEADER AND DATA COMMAND
1473    023426  012702  001555                  MOV     #PUTINX,R2      ;READ REGISTER INDEX TABLE
1474    023432  112722  000006                  MOVB    #RMDA,(R2)+
1475    023436  112722  000034                  MOVB    #RMDC,(R2)+
1476    023442  112722  000032                  MOVB    #RMOF,(R2)+
1477    023446  112722  000002                  MOVB    #RMWC,(R2)+
1478    023452  112722  000004                  MOVB    #RMBA,(R2)+
1479    023456  112722  000000                  MOVB    #RMCS1,(R2)+
1480    023462  112722  000200                  MOVB    #200,(R2)+      ;SET TERMINATOR BYTE
1481
1482    023466  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        023472  000404                          BR      3$              ;GO TO 3$ IF NO ERROR
        023474  000240                          NOP                     ;RETURN HERE IF ERROR
        023476  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        023500  000137  023632                  JMP     8$              ;GO TO 8$ IF ERROR
1483    023504                          3$:
1484
1485                                    ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1486    023504  004737  035450                  JSR     PC,GETSTS
1487    023510  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1488
1489    023514  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        023520  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
        023522  000240                          NOP                     ;RETURN HERE IF ERROR
        023524  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        023526  000137  023632                  JMP     8$              ;GO TO 8$ IF ERROR
1490    023532                          4$:
1491
1492                                    ;VERIFY RESULTS OF READ COMMAND
1493    023532  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        023536  000405                          BR      5$              ;GO TO 5$ IF NO ERROR
        023540  000240                          NOP                     ;RETURN HERE IF ERROR
        023542  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        023544  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        023546  000137  023632                  JMP     8$              ;GO TO 8$ IF ERROR
1494    023552                          5$:
1495    023552  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        023556  000405                          BR      6$              ;GO TO 6$ IF NO ERROR
        023560  000240                          NOP                     ;RETURN HERE IF ERROR
        023562  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        023564  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        023566  000137  023632                  JMP     8$              ;GO TO 8$ IF ERROR
1496    023572                          6$:
1497    023572  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        023576  000405                          BR      7$              ;GO TO 7$ IF NO ERROR
        023600  000240                          NOP                     ;RETURN HERE IF ERROR
        023602  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        023604  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        023606  000137  023632                  JMP     8$              ;GO TO 8$ IF ERROR
1498    023612                          7$:
```

```
1499
1500                                    ;INCREMENT ADDRESS AND FORMAT NEXT TRACK
1501 023612  105237  001421                    INCB    RMDA0+1                 ;ADVANCE TRACK COUNT
1502 023616  123727  001421  000200            CMPB    RMDA0+1,#128.           ;DONE ALL TRACKS??
1503 023624  101002                            BHI     8$                      ;YES!!
1504 023626  000137  023406                    JMP     1$                      ;GO DO NEXT TRACK
1505 023632                             8$:
1506
1507                                    ;;*****************************************************************
                                        ;*TEST 23       READ INVALID CYLINDER ADDRESS
                                        ;;*****************************************************************
     023632                             TST23:
     023632  000004                            SCOPE                           ;SCOPE CALL
     023634  000240                            NOP                             ;START OF TEST
     023636  012706  001100                    MOV     #STACK,SP               ;INITIALIZE STACK POINTER
     023642  013700  001270                    MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS
     023646  013701  001466                    MOV     TSTQUE,R1               ;(R1) = DEVICE BEING TESTED
     023652  012737  000023  001226            MOV     #23,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
1508
1509 023660  012737  001061  001446            MOV     #561.,RMDC0             ;START AT FIRST INVALID CYLINDER
1510 023666  012737  000000  001420            MOV     #0,RMDA0                ;TRACK = 0, SECTOR = 0
1511 023674  012737  010000  001444            MOV     #FMT16,RMOF0            ;16 BIT FORMAT
1512 023702  012737  177376  001414            MOV     #-258.,RMWC0            ;2 + 256 WORDS (2'S COMP)
1513 023710  012737  101716  001416            MOV     #BUFONE,RMBA0           ;DATA BUFFER ADDRESS
1514 023716  012737  000073  001412            MOV     #RH!GO,RMCS10           ;READ HEADER AND DATA
1515 023724                             1$:
1516
1517                                    ;PREPARE DEVICE FOR DATA TRANSFER
1518 023724  004737  031456                    JSR     PC,TSTPRP               ;PREPARE DEVICE FOR TEST
     023730  154130                            .WORD   154130                  ;TASK DESCRIPTOR AS FOLLOWS:
                                                                               ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                               ;CLEAR CONTROLLER & SELECT DEVICE
                                                                               ;VERIFY CONTROLLER CLEAR OPERATION
                                                                               ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                               ;VERIFY PACK ACKNOWLEDGE
                                                                               ;RECALIBRATE IF "OKI" OR "PIP" IS SET
                                                                               ;VERIFY RECALIBRATION
     023732  000404                            BR      2$                      ;GO TO 2$ IF NO ERROR
     023734  000240                            NOP                             ;RETURN HERE IF ERROR
     023736  104000                            EMT                             ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     023740  000137  024150                    JMP     8$                      ;GO TO 8$ IF ERROR
1519 023744                             2$:
1520
1521                                    ;SETUP AND EXECUTE READ HEADER AND DATA COMMAND
1522 023744  012702  001555                    MOV     #PUTINX,R2              ;LOAD REGISTER INDEX TABLE
1523 023750  112722  000006                    MOVB    #RMDA,(R2)+
1524 023754  112722  000034                    MOVB    #RMDC,(R2)+
1525 023760  112722  000032                    MOVB    #RMOF,(R2)+
1526 023764  112722  000002                    MOVB    #RMWC,(R2)+
1527 023770  112722  000004                    MOVB    #RMBA,(R2)+
1528 023774  112722  000000                    MOVB    #RMCS1,(R2)+
1529 024000  112722  000200                    MOVB    #200,(R2)+              ;SET TERMINATOR BYTE
1530
1531 024004  004737  036004                    JSR     PC,PUT                  ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     024010  000404                            BR      3$                      ;GO TO 3$ IF NO ERROR
     024012  000240                            NOP                             ;RETURN HERE IF ERROR
     024014  104000                            EMT                             ;ERROR # DEFINED BY PUT SUBROUTINE
```

```
T23     READ INVALID CYLINDER ADDRESS

        024016  000137  024150                  JMP     8$              ;GO TO 8$ IF ERROR
   1532 (24022                             3$:
   1533
   1534                                    ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
   1535 024022  004737  035450                  JSR     PC,GETSTS
   1536 024026  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
   1537
   1538 024032  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        024036  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
        024040  000240                          NOP                     ;RETURN HERE IF ERROR
        024042  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        024044  000137  024150                  JMP     8$              ;GO TO 8$ IF ERROR
   1539 024050                             4$:
   1540
   1541                                    ;VERIFY RESULTS OF READ COMMAND
   1542 024050  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        024054  000405                          BR      5$              ;GO TO 5$ IF NO ERROR
        024056  000240                          NOP                     ;RETURN HERE IF ERROR
        024060  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        024062  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        024064  000137  024150                  JMP     8$              ;GO TO 8$ IF ERROR
   1543 024070                             5$:
   1544 024070  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        024074  000405                          BR      6$              ;GO TO 6$ IF NO ERROR
        024076  000240                          NOP                     ;RETURN HERE IF ERROR
        024100  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        024102  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        024104  000137  024150                  JMP     8$              ;GO TO 8$ IF ERROR
   1545 024110                             6$:
   1546 024110  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        024114  000405                          BR      7$              ;GO TO 7$ IF NO ERROR
        024116  000240                          NOP                     ;RETURN HERE IF ERROR
        024120  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        024122  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        024124  000137  024150                  JMP     8$              ;GO TO 8$ IF ERROR
   1547 024130                             7$:
   1548
   1549                                    ;INCREMENT ADDRESS AND FORMAT NEXT CYLINDER
   1550 024130  005237  001446                  INC     RMDCO                   ;ADVANCE CYLINDER COUNT
   1551 024134  023727  001446  002000          CMP     RMDCO,#1024.            ;DONE ALL CYLINDERS??
   1552 024142  103002                          BHIS    8$                      ;YES!!
   1553 024144  000137  023724                  JMP     1$                      ;GO DO NEXT SECTOR
   1554 024150                             8$:
   1555
   1556                                    ;;*************************************************************************
                                           ;*TEST 24        FORMAT AT OFFSET
                                           ;;*************************************************************************
        024150                             TST24:
        024150  000004                          SCOPE                   ;SCOPE CALL
        024152  000240                          NOP                     ;START OF TEST
        024154  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK POINTER
        024160  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        024164  013701  001466                  MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
        024170  012737  000024  001226          MOV     #24,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
   1557
   1558                                    ;;SETUP PARAMETERS FOR GENERATING DATA BUFFER
   1559 024176  012737  001057  001446          MOV     #559.,RMDCO             ;CYLINDER = 559.
```

```
T24     FORMAT AT OFFSET

 1500 024204  012737  001000  001420          MOV     #TA2,RMDA0              ;TRACK = 2, SECTOR = 0
 1561 024212  012737  010000  001444          MOV     #FMT16,RMOF0            ;16 BIT FORMAT
 1562 024220  012737  177376  001414          MOV     #-258.,RMWC0            ;2 + 256 WORDS (2'S COMP)
 1563 024226  012737  101716  001416          MOV     #BUFONE,RMBA0           ;DATA BUFFER ADDRESS
 1564 024234  012737  000063  001412          MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
 1565
 1566                                  ;VERIFY THAT SECTOR IS NOT BAD
      024242  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
      024246  000405                          BR      1$              ;GO TO 1$ IF NO ERROR
      024250  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
      024254  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
      024256  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
 1567 024262                          1$:
 1568 024262  012737  001420  001174          MOV     #RMDA0,$TMP0            ;USE SECTOR FOR DATA PATTERN
 1569 024270  012737  000001  001176          MOV     #1,$TMP1
 1570 024276  004737  034640                  JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
 1571 024302                          2$:
 1572
 1573                                  ;PREPARE DEVICE FOR DATA TRANSFER
 1574 024302  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
      024306  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                      ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                      ;CLEAR CONTROLLER & SELECT DEVICE
                                                                      ;VERIFY CONTROLLER CLEAR OPERATION
                                                                      ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                      ;VERIFY PACK ACKNOWLEDGE
                                                                      ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                      ;VERIFY RECALIBRATION
      024310  000404                          BR      3$              ;GO TO 3$ IF NO ERROR
      024312  000240                          NOP                     ;RETURN HERE IF ERROR
      024314  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
      024316  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
 1575 024322                          3$:
 1576
 1577                                  ;OFFSET DEVICE FOR WRITE
 1578 024322  012737  000015  001412          MOV     #OFFSET!GO,RMCS10       ;CHANGE TO OFFSET COMMAND
 1579 024330  012702  001555                  MOV     #PUTINX,R2              ;WRITE PUT INDEX TABLE
 1580 024334  112722  000006                  MOVB    #RMDA,(R2)+
 1581 024340  112722  000034                  MOVB    #RMDC,(R2)+
 1582 024344  112722  000032                  MOVB    #RMOF,(R2)+
 1583 024350  112722  000000                  MOVB    #RMCS1,(R2)+
 1584 024354  112712  000200                  MOVB    #200,(R2)               ;TERMINATE TABLE
 1585
 1586 024360  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
      024364  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
      024366  000240                          NOP                     ;RETURN HERE IF ERROR
      024370  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
      024372  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
 1587 024376                          4$:
 1588
 1589                                  ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND AT OFFSET
 1590 024376  012737  000063  001412          MOV     #WH!GO,RMCS10           ; WRITE HEADER AND DATA COMMAND
 1591 024404  012702  001555                  MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
 1592 024410  112722  000002                  MOVB    #RMWC,(R2)+
 1593 024414  112722  000004                  MOVB    #RMBA,(R2)+
 1594 024420  112722  000000                  MOVB    #RMCS1,(R2)+
 1595 024424  112722  000200                  MOVB    #200,(R2)+
```

```
1596
1597 024430  004737  036004                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
      024434  000404                        BR      5$              ;GO TO 5$ IF NO ERROR
      024436  000240                        NOP                     ;RETURN HERE IF ERROR
      024440  104000                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
      024442  000137  025062                JMP     17$             ;GO TO 17$ IF ERROR
1598 024446                           5$:
1599
1600                                  ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1601 024446  004737  035450                JSR     PC,GETSTS
1602 024452  004737  036356                JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1603
1604 024456  004737  035534                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
      024462  000404                        BR      6$              ;GO TO 6$ IF NO ERROR
      024464  000240                        NOP                     ;RETURN HERE IF ERROR
      024466  104000                        EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
      024470  000137  025062                JMP     17$             ;GO TO 17$ IF ERROR
1605 024474                           6$:
1606
1607                                  ;VERIFY RESULTS OF WRITE COMMAND
1608 024474  004737  036552                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
      024500  000405                        BR      7$              ;GO TO 7$ IF NO ERROR
      024502  000240                        NOP                     ;RETURN HERE IF ERROR
      024504  104000                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
      024506  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
      024510  000137  025062                JMP     17$             ;GO TO 17$ IF ERROR
1609 024514                           7$:
1610 024514  004737  051612                JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
      024520  000405                        BR      8$              ;GO TO 8$ IF NO ERROR
      024522  000240                        NOP                     ;RETURN HERE IF ERROR
      024524  104000                        EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
      024526  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
      024530  000137  025062                JMP     17$             ;GO TO 17$ IF ERROR
1611 024534                           8$:
1612 024534  004737  037404                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
      024540  000405                        BR      9$              ;GO TO 9$ IF NO ERROR
      024542  000240                        NOP                     ;RETURN HERE IF ERROR
      024544  104000                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
      024546  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
      024550  000137  025062                JMP     17$             ;GO TO 17$ IF ERROR
1613 024554                           9$:
1614                                  ;OFFSET DEVICE FOR READ
1615 024554  012737  000015  001412        MOV     #OFFSET!GO,RMCS10       ;CHANGE TO OFFSET COMMAND
1616 024562  012702  001555                MOV     #PUTINX,R2              ;WRITE PUT INDEX TABLE
1617 024566  112722  000006                MOVB    #RMDA,(R2)+
1618 024572  112722  000034                MOVB    #RMDC,(R2)+
1619 024576  112722  000032                MOVB    #RMOF,(R2)+
1620 024602  112722  000000                MOVB    #RMCS1,(R2)+
1621 024606  112722  000200                MOVB    #200,(R2)+
1622
1623 024612  004737  036004                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
      024616  000404                        BR      10$             ;GO TO 10$ IF NO ERROR
      024620  000240                        NOP                     ;RETURN HERE IF ERROR
      024622  104000                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
      024624  000137  025062                JMP     17$             ;GO TO 17$ IF ERROR
1624 024630                           10$:
1625
```

```
                                        ;READ HEADER AND DATA AT OFFSET
1626
1627 024630  012737  000073  001412          MOV     #RH!GO,PMCS10           ;READ HEADER & DATA COMMAND
1628 024636  012737  102722  001416          MOV     #BUFTWO,RMBA0           ;CHANGE BUS ADDRESS
1629 024644  012702  001555                  MOV     #PUTINX,R2              ;WRITE PUT INDEX TABLE
1630 024650  112722  000002                  MOVB    #RMWC,(R2)+
1631 024654  112722  000004                  MOVB    #RMBA,(R2)+
1632 024660  112722  000000                  MOVB    #RMCS1,(R2)+
1633 024664  112722  000200                  MOVB    #200,(R2)+
1634
1635 024670  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     024674  000404                          BR      11$             ;GO TO 11$ IF NO ERROR
     024676  000240                          NOP                     ;RETURN HERE IF ERROR
     024700  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     024702  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
1636 024706                          11$:
1637
1638                                    ;WAIT FOR READ TO COMPLETE AND GET STATUS
1639 024706  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
1640
1641 024712  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     024716  000404                          BR      12$             ;GO TO 12$ IF NO ERROR
     024720  000240                          NOP                     ;RETURN HERE IF ERROR
     024722  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     024724  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
1642 024730                          12$:
1643
1644                                    ;VERIFY THE RESULTS OF READ OPERATION
1645 024730  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     024734  000405                          BR      13$             ;GO TO 13$ IF NO ERROR
     024736  000240                          NOP                     ;RETURN HERE IF ERROR
     024740  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     024742  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     024744  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
1646 024750                          13$:
1647 024750  004737  051012                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     024754  000405                          BR      14$             ;GO TO 14$ IF NO ERROR
     024756  000240                          NOP                     ;RETURN HERE IF ERROR
     024760  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     024762  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     024764  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
1648 024770                          14$:
1649 024770  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     024774  000405                          BR      15$             ;GO TO 15$ IF NO ERROR
     024776  000240                          NOP                     ;RETURN HERE IF ERROR
     025000  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     025002  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     025004  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
1650 025010                          15$:
1651
1652                                    ;VERIFY DATA
1653 025010  004737  035106                  JSR     PC,CMPBUF       ;GO COMPARE WRITE, READ DATA BUFFERS
     025014  101716                          .WORD   BUFONE          ;STARTING ADDRESS OF WRITE BUFFER
     025016  102722                          .WORD   BUFTWO          ;STARTING ADDRESS OF READ BUFFER
     025020  000404                          BR      16$             ;GO TO 16$ IF NO ERROR
     025022  000240                          NOP                     ;RETURN HERE IF ERROR
     025024  104000                          EMT                     ;ERROR # DEFINED BY CMPBUF SUBROUTINE
     025026  000137  025062                  JMP     17$             ;GO TO 17$ IF ERROR
```

```
1654 025032                                16$:
1655 025032  032737  000200  001444              BIT     #OFD,RMOFO              ;DONE BOTH OFFSETS??
1656 025040  001010                              BNE     17$                     ;YES!!
1657 025042  052737  000200  001444              BIS     #OFD,RMOFO              ;SET FORWARD OFFSET
1658 025050  012737  101716  001416              MOV     #BUFONE,RMBAO           ;CHANGE DATA BUFFER
1659 025056  000137  024302                      JMP     2$
1660 025062                                17$:
1661
1662                                       ;;*****************************************************************
                                           ;*TEST 25        IVC FORMAT TEST
                                           ;;*****************************************************************
     025062                                TST25:
     025062  000004                              SCOPE                           ;SCOPE CALL
     025064  000240                              NOP                             ;START OF TEST
     025066  012706  001100                      MOV     #STACK,SP               ;INITIALIZE STACK POINTER
     025072  013700  001276                      MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS
     025076  013701  001466                      MOV     TSTQUE,R1               ;(R1) = DEVICE BEING TESTED
     025102  012737  000025  001226              MOV     #25,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
1663
1664                                       ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
1665 025110  012737  001057  001446              MOV     #559.,RMDCO             ;CYLINDER = 559.
1666 025116  012737  001000  001420              MOV     #TA2,RMDAO              ;TRACK = 2, SECTOR = 0
1667 025124  012737  010000  001444              MOV     #FMT16,RMOFO            ;16 BIT FORMAT
1668 025132  012737  177376  001414              MOV     #-258.,RMWCO            ;2 + 256 WORDS (2'S COMP)
1669 025140  012737  101716  001416              MOV     #BUFONE,RMBAO           ;DATA BUFFER ADDRESS
1670 025146  012737  000062  001412              MOV     #WH,RMCS1O              ;WRITE HEADER AND DATA
1671
1672                                       ;VERIFY THAT SECTOR IS NOT BAD
     025154  004737  032406                      JSR     PC,BADSCT               ;CALL BAD SECTOR MODULE
     025160  000405                              BR      1$                      ;GO TO 1$ IF NO ERROR
     025162  104401  063446                      TYPE    ,SCTMSG                 ;TYPE BAD SECTOR MESSAGE
     025166  104000                              EMT                             ;ERROR # DEFINED BY BADSCT SUBROUTINE
     025170  000137  025704                      JMP     16$                     ;GO TO 16$ IF ERROR
1673 025174                                1$:
1674 025174  012737  001420  001174              MOV     #RMDAO,$TMP0                    ;USE SECTOR FOR DATA PATTERN
1675 025202  012737  000001  001176              MOV     #1,$TMP1
1676 025210  004737  034640                      JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
1677 025214                                2$:
1678
1679                                       ;PREPARE DEVICE FOR DATA TRANSFER
1680 025214  004737  031456                      JSR     PC,TSTPRP               ;PREPARE DEVICE FOR TEST
     025220  154130                              .WORD   154130                  ;TASK DESCRIPTOR AS FOLLOWS:
                                                                                 ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                                 ;CLEAR CONTROLLER & SELECT DEVICE
                                                                                 ;VERIFY CONTROLLER CLEAR OPERATION
                                                                                 ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                                 ;VERIFY PACK ACKNOWLEDGE
                                                                                 ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                                 ;VERIFY RECALIBRATION
     025222  000404                              BR      3$                      ;GO TO 3$ IF NO ERROR
     025224  000240                              NOP                             ;RETURN HERE IF ERROR
     025226  104000                              EMT                             ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     025230  000137  025704                      JMP     16$                     ;GO TO 16$ IF ERROR
1681 025234                                3$:
1682
1683                                       ;RESET VOLUME VALID BY SETTING AND RESETTING DIAGNOSTIC MODE
1684 025234  012737  000001  001436              MOV     #DMD,RMMR1O                     ;SET DIAGNOSTIC MODE
```

```
1685 025242  112737  000024  001555          MOVB    #RMMR1,PUTINX           ;WRITE REGISTER INDEX TABLE
1686 025250  112737  000200  001556          MOVB    #200,PUTINX+1
1687
1688 025256  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     025262  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
     025264  000240                          NOP                     ;RETURN HERE IF ERROR
     025266  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     025270  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1689 025274                          4$:
1690
1691                                 ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
1692 025274  012737  000063  001412          MOV     #WHIGO,RMCS10           ;WRITE HEADER AND DATA
1693 025302  012737  000000  001436          MOV     #0,RMMR10               ;RESET DIAGNOSTIC MODE
1694 025310  012702  001555                  MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1695 025314  112722  000024                  MOVB    #RMMR1,(R2)+
1696 025320  112722  000006                  MOVB    #RMDA,(R2)+
1697 025324  112722  000034                  MOVB    #RMDC,(R2)+
1698 025330  112722  000032                  MOVB    #RMOF,(R2)+
1699 025334  112722  000002                  MOVB    #RMWC,(R2)+
1700 025340  112722  000004                  MOVB    #RMBA,(R2)+
1701 025344  112722  000000                  MOVB    #RMCS1,(R2)+
1702 025350  112722  000200                  MOVB    #200,(R2)+
1703
1704 025354  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     025360  000404                          BR      5$              ;GO TO 5$ IF NO ERROR
     025362  000240                          NOP                     ;RETURN HERE IF ERROR
     025364  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     025366  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1705 025372                          5$:
1706
1707                                 ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1708 025372  004737  035450                  JSR     PC,GETSTS
1709 025376  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1710
1711 025402  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     025406  000404                          BR      6$              ;GO TO 6$ IF NO ERROR
     025410  000240                          NOP                     ;RETURN HERE IF ERROR
     025412  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     025414  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1712 025420                          6$:
1713
1714                                 ;VERIFY RESULTS OF WRITE COMMAND
1715 025420  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     025424  000405                          BR      7$              ;GO TO 7$ IF NO ERROR
     025426  000240                          NOP                     ;RETURN HERE IF ERROR
     025430  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     025432  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     025434  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1716 025440                          7$:
1717 025440  032737  010000  001400          BIT     #IVC,RMER2I             ;IS IVC STATUS SET??
1718 025446  001012                          BNE     8$              ;YES!!
1719 025450  013737  001400  001142          MOV     RMER2I,$BDDAT           ;RECEIVED STATUS FOR TYPEOUT
1720 025456  013737  001400  001140          MOV     RMER2I,$GDDAT           ;EXPECTED STATUS
1721 025464  052737  010000  001140          BIS     #IVC,$GDDAT
1722 025472  104342                          EMT     342
1723 025474                          8$:
1724 025474  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
```

```
025500  000405                          BR      9$              ;GO TO 9$ IF NO ERROR
025502  000240                          NOP                     ;RETURN HERE IF ERROR
025504  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
025506  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
025510  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1725 025514                     9$:
1726
1727                            ;CLEAR IVC ERROR
1728 025514  004737  031456            JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
025520  040100                          .WORD   040100          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                ;CLEAR CONTROLLER & SELECT DEVICE
                                                                ;VERIFY CONTROLLER CLEAR OPERATION
025522  000404                          BR      10$              GO TO 10$ IF NO ERROR
025524  000240                          NOP                     ;RETURN HERE IF ERROR
025526  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
025530  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1729 025534                     10$:
1730
1731                            ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
1732 025534  012737  000073  001412        MOV     #RH!GO,RMCS1O           ;READ HEADER & DATA COMMAND
1733 025542  012737  102722  001416        MOV     #BUFTWO,RMBAO           ;CHANGE BUS ADDRESS
1734
1735 025550  004737  036004            JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
025554  000404                          BR      11$             ;GO TO 11$ IF NO ERROR
025556  000240                          NOP                     ;RETURN HERE IF ERROR
025560  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
025562  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1736 025566                     11$:
1737
1738                            ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1739 025566  004737  035450            JSR     PC,GETSTS
1740 025572  004737  036356            JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
1741
1742 025576  004737  035534            JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
025602  000404                          BR      12$             ;GO TO 12$ IF NO ERROR
025604  000240                          NOP                     ;RETURN HERE IF ERROR
025606  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
025610  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1743 025614                     12$:
1744
1745                            ;VERIFY THE RESULTS OF READ OPERATION
1746 025614  004737  036552            JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
025620  000405                          BR      13$             ;GO TO 13$ IF NO ERROR
025622  000240                          NOP                     ;RETURN HERE IF ERROR
025624  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
025626  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
025630  000137  025704                  JMP     16$             ;GO TO 16$ IF ERROR
1747 025634                     13$:
1748 025634  032737  010000  001400        BIT     #IVC,RMER2I             ;IS IVC STATUS SET??
1749 025642  001012                        BNE     14$             ;YES!!
1750 025644  013737  001400  001142        MOV     RMER2I,$BDDAT           ;RECEIVED STATUS FOR TYPEOUT
1751 025652  013737  001400  001140        MOV     RMER2I,$GDDAT           ;EXPECTED STATUS
1752 025660  052737  010000  001140        BIS     #IVC,$GDDAT
1753 025666  104342                        EMT     342
1754 025670                     14$:
1755 025670  004737  037404            JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
025674  000403                          BR      15$             ;GO TO 15$ IF NO ERROR
```

```
        025676  000240                          NOP                     ;RETURN HERE IF ERROR
        025700  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        025702  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
   1756 025704                          15$:
   1757
   1758 025704                          16$:
   1759
   1760                                 ;;*****************************************************************
                                        ;*TEST 26        FORMAT ERROR TEST
                                        ;;*****************************************************************
        025704                          TST26:
        025704  000004                          SCOPE                   ;SCOPE CALL
        025706  000240                          NOP                     ;START OF TEST
        025710  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK POINTER
        025714  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        025720  013701  001466                  MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
        025724  012737  000026  001226          MOV     #26.,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
   1761
   1762                                 ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
   1763 025732  012737  001057  001446          MOV     #559.,RMDC0             ;CYLINDER = 559.
   1764 025740  012737  001000  001420          MOV     #TA2,RMDA0              ;TRACK = 2, SECTOR = 0
   1765 025746  012737  010000  001444          MOV     #FMT16,RMOF0            ;16 BIT FORMAT
   1766 025754  012737  177376  001414          MOV     #-258.,RMWC0            ;2 + 256 WORDS (2'S COMP)
   1767 025762                          1$:
   1768 025762  012737  101716  001416          MOV     #BUFONE,RMBA0           ;DATA BUFFER ADDRESS
   1769 025770  012737  000062  001412          MOV     #WH,RMCS10              ;WRITE HEADER AND DATA
   1770
   1771                                 ;VERIFY THAT SECTOR IS NOT BAD
        025776  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
        026002  000405                          BR      2$              ;GO TO 2$ IF NO ERROR
        026004  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
        026010  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
        026012  000137  026606                  JMP     22$             ;GO TO 22$ IF ERROR
   1772 026016                          2$:
   1773 026016  012737  065116  001174          MOV     #ZEROS,$TMP0            ;USE ALL ZEROS DATA PATTERN
   1774 026024  012737  000001  001176          MOV     #1,$TMP1
   1775 026032  004737  034640                  JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
   1776 026036                          3$:
   1777
   1778                                 ;PREPARE DEVICE FOR DATA TRANSFER
   1779 026036  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
        026042  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                        ;VERIFY RECALIBRATION
        026044  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
        026046  000240                          NOP                     ;RETURN HERE IF ERROR
        026050  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
        026052  000137  026606                  JMP     22$             ;GO TO 22$ IF ERROR
   1780 026056                          4$:
   1781
   1782                                 ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
   1783 026056  012737  000062  001412          MOV     #WH,RMCS10              ;WRITE HEADER AND DATA
```

```
1784 026064  012702  001555                    MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1785 026070  112722  000006                    MOVB    #RMDA,(R2)+
1786 026074  112722  000034                    MOVB    #RMDC,(R2)+
1787 026100  112722  000032                    MOVB    #RMOF,(R2)+
1788 026104  112722  000002                    MOVB    #RMWC,(R2)+
1789 026110  112722  000004                    MOVB    #RMBA,(R2)+
1790 026114  112722  000000                    MOVB    #RMCS1,(R2)+
1791 026120  112722  000200                    MOVB    #200,(R2)+
1792
1793 026124  004737  036004                    JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     026130  000404                            BR      5$              ;GO TO 5$ IF NO ERROR
     026132  000240                            NOP                     ;RETURN HERE IF ERROR
     026134  104000                            EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     026136  000137  026606                    JMP     22$             ;GO TO 22$ IF ERROR
1794 026142                            5$:
1795 026142  012702  000002                    MOV     #2,R2           ;DO 2 CLOCK CYCLES
1796 026146  004737  036520            6$:     JSR     PC,STIMER       ;START CLOCK TIMER
1797 026152  032777  000200  153342    7$:     BIT     #BIT7,@CLKADR   ;TIMER DONE??
1798 026160  001774                            BEQ     7$              ;NO!!
1799 026162  005302                            DEC     R2              ;DEC NUMBER OF CYCLES
1800 026164  001370                            BNE     6$              ;CONTINUE IF NOT DONE
1801
1802 026166  012737  000063  001412            MOV     #WH!GO,RMCS10   ;WRITE HEADER AND DATA
1803
1804 026174  004737  036004                    JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     026200  000404                            BR      8$              ;GO TO 8$ IF NO ERROR
     026202  000240                            NOP                     ;RETURN HERE IF ERROR
     026204  104000                            EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     026206  000137  026606                    JMP     22$             ;GO TO 22$ IF ERROR
1805 026212                            8$:
1806
1807                                   ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1808 026212  004737  035450                    JSR     PC,GETSTS
1809 026216  004737  036356                    JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1810
1811 026222  004737  035534                    JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     026226  000404                            BR      9$              ;GO TO 9$ IF NO ERROR
     026230  000240                            NOP                     ;RETURN HERE IF ERROR
     026232  104000                            EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     026234  000137  026606                    JMP     22$             ;GO TO 22$ IF ERROR
1812 026240                            9$:
1813
1814                                   ;VERIFY RESULTS OF WRITE COMMAND
1815 026240  004737  036552                    JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     026244  000405                            BR      10$             ;GO TO 10$ IF NO ERROR
     026246  000240                            NOP                     ;RETURN HERE IF ERROR
     026250  104000                            EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     026252  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     026254  000137  026606                    JMP     22$             ;GO TO 22$ IF ERROR
1816 026260                            10$:
1817 026260  004737  051612                    JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     026264  000405                            BR      11$             ;GO TO 11$ IF NO ERROR
     026266  000240                            NOP                     ;RETURN HERE IF ERROR
     026270  104000                            EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     026272  004736                            JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     026274  000137  026606                    JMP     22$             ;GO TO 22$ IF ERROR
1818 026300                            11$:
```

```
1819 026300  004737  037404                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     026304  000405                        BR      12$             ;GO TO 12$ IF NO ERROR
     026306  000240                        NOP                     ;RETURN HERE IF ERROR
     026310  104000                        EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     026312  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     026314  000137  026606                JMP     22$             ;GO TO 22$ IF ERROR
1820 026320                          12$:
1821
1822                                 ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN IN OPPOSITE FORMAT
1823                                 ;AND CHECK THAT "FER" SETS
1824
1825 026320  005137  001444                COM     RMOFO                   ;CHANGE TO OPPOSITE FORMAT
1826 026324  042737  167777  001444        BIC     #^C<FMT16>,RMOFO
1827 026332  012737  102722  001416        MOV     #BUFTWO,RMBAO           ;CHANGE BUS ADDRESS
1828 026340  012737  000072  001412        MOV     #RH,RMCS10              ;READ HEADER & DATA COMMAND
1829
1830 026346  004737  036004                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     026352  000404                        BR      13$             ;GO TO 13$ IF NO ERROR
     026354  000240                        NOP                     ;RETURN HERE IF ERROR
     026356  104000                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     026360  000137  026606                JMP     22$             ;GO TO 22$ IF ERROR
1831 026364                          13$:
1832 026364  012702  000002                MOV     #2,R2           ;DO 2 CLOCK CYCLES
1833 026370  004737  036520          14$:  JSR     PC,STIMER       ;START CLOCK TIMER
1834 026374  032777  000200  153120  15$:  BIT     #BIT7,@CLKADR   ;TIMER DONE??
1835 026402  001774                        BEQ     15$             ;NO!!
1836 026404  005302                        DEC     R2              ;DEC NUMBER OF CYCLES
1837 026406  001370                        BNE     14$             ;CONTINUE IF NOT DONE
1838
1839 026410  012737  000073  001412        MOV     #RH!GO,RMCS10   ;READ HEADER & DATA COMMAND
1840
1841 026416  004737  036004                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     026422  000404                        BR      16$             ;GO TO 16$ IF NO ERROR
     026424  000240                        NOP                     ;RETURN HERE IF ERROR
     026426  104000                        EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     026430  000137  026606                JMP     22$             ;GO TO 22$ IF ERROR
1842 026434                          16$:
1843
1844                                 ;WAIT FOR READ TO COMPLETE AND GET STATUS
1845 026434  004737  036356                JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
1846
1847 026440  004737  035534                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     026444  000404                        BR      17$             ;GO TO 17$ IF NO ERROR
     026446  000240                        NOP                     ;RETURN HERE IF ERROR
     026450  104000                        EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     026452  000137  026606                JMP     22$             ;GO TO 22$ IF ERROR
1848 026456                          17$:
1849
1850                                 ;VERIFY THE RESULTS OF READ OPERATION
1851 026456  004737  036552                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     026462  000405                        BR      18$             ;GO TO 18$ IF NO ERROR
     026464  000240                        NOP                     ;RETURN HERE IF ERROR
     026466  104000                        EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     026470  004736                        JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     026472  000137  026606                JMP     22$             ;GO TO 22$ IF ERROR
1852 026476                          18$:
1853
```

```
1854                                    ;VERIFY THAT FORMAT ERROR IS SET
1855 026476  032737  000020  001352      BIT     #FER,RMER1I             ;IS FORMAT ERROR SET??
1856 026504  001022                      BNE     20$                     ;YES!!
1857
1858 026506  004737  051612              JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     026512  000405                      BR      19$             ;GO TO 19$ IF NO ERROR
     026514  000240                      NOP                     ;RETURN HERE IF ERROR
     026516  104000                      EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     026520  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     026522  000137  026606              JMP     22$             ;GO TO 22$ IF ERROR
1859
1860 026526  013737  001352  001142  19$:    MOV     RMER1I,$BDDAT           ;BAD DATA FOR TYPEOUT
1861 026534  013737  001352  001140          MOV     RMER1I,$GDDAT           ;EXPECTED DATA
1862 026542  052737  000020  001140          BIS     #FER,$GDDAT
1863 026550  104343                      EMT     343
1864 026552                          20$:
1865 026552  004737  037404              JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     026556  000405                      BR      21$             ;GO TO 21$ IF NO ERROR
     026560  000240                      NOP                     ;RETURN HERE IF ERROR
     026562  104000                      EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     026564  004736                      JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     026566  000137  026606              JMP     22$             ;GO TO 22$ IF ERROR
1866 026572                          21$:
1867 026572  032737  010000  001444      BIT     #FMT16,RMOFO            ;TEST WRITE IN 18 BIT FORMAT AND
1868                                                                     ;READ IN 16 BIT FORMAT ?
1869 026600  001002                      BNE     22$                     ;BR IF YES
1870 026602  000137  025762              JMP     1$                      ;TEST AGAIN
1871 026606                          22$:
1872
1873                                    ;;*****************************************************************
                                        ;*TEST 27       FORMAT HCE. FIRST HEADER WORD
                                        ;;*****************************************************************
     026606                             TST27:
     026606  000004                          SCOPE                   ;SCOPE CALL
     026610  000240                          NOP                     ;START OF TEST
     026612  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     026616  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     026622  013701  001466                  MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     026626  012737  000027  001226          MOV     #27,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
1874
1875 026634  012737  000001  027672          MOV     #1,25$                  ;INIT BIT POSITION
1876
1877                                    ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
1878 026642                             1$:
1879 026642  012737  010000  001444          MOV     #FMT16,RMOFO            ;16 BIT FORMAT
1880 026650  012737  001057  001446          MOV     #559.,RMDCO             ;CYLINDER = 559.
1881 026656  012737  001000  001420          MOV     #TA2,RMDAO              ;TRACK = 2, SECTOR = 0
1882 026664  012737  177376  001414          MOV     #-258.,RMWCO            ;2 + 256 WORDS (2'S COMP)
1883 026672  012737  101716  001416          MOV     #BUFONE,RMBAO           ;DATA BUFFER ADDRESS
1884 026700  012737  000062  001412          MOV     #WH,RMCS1O              ;WRITE HEADER AND DATA
1885
1886                                    ;VERIFY THAT SECTOR IS NOT BAD
     026706  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
     026712  000405                          BR      2$              ;GO TO 2$ IF NO ERROR
     026714  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
     026720  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
     026722  000137  027674                  JMP     27$             ;GO TO 27$ IF ERROR
```

```
1887 026726                                  2$:
1888 026726  012737  065116  001174                MOV     #ZEROS,$TMP0            ;USE ALL ZEROS DATA PATTERN
1889 026734  012737  000001  001176                MOV     #1,$TMP1
1890 026742  004737  034640                        JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
1891 026746                                  3$.
1892
1893                                         ;PREPARE DEVICE FOR DATA TRANSFER
1894 026746  004737  031456                        JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     026752  154130                                .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                            ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                            ;CLEAR CONTROLLER & SELECT DEVICE
                                                                            ;VERIFY CONTROLLER CLEAR OPERATION
                                                                            ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                            ;VERIFY PACK ACKNOWLEDGE
                                                                            ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                            ;VERIFY RECALIBRATION
     026754  000404                                BR      4$              ;GO TO 4$ IF NO ERROR
     026756  000240                                NOP                     ;RETURN HERE IF ERROR
     026760  104000                                EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     026762  000137  027674                        JMP     27$             ;GO TO 27$ IF ERROR
1895 026766                                  4$:
1896
1897                                         ;COMPLEMENT DATA BIT IN FIRST HEADER WORD
1898 026766  033737  027672  101716                BIT     25$,BUFONE              ;IS BIT IN HEADER ON??
1899 026774  001404                                BEQ     5$                      ;NO!!
1900 026776  043737  027672  101716                BIC     25$,BUFONE              ;RESET BIT IN HEADER
1901 027004  000403                                BR      6$
1902 027006  053737  027672  101716  5$:           BIS     25$,BUFONE              ;SET BIT IN HEADER
1903
1904                                         ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
1905 027014                                  6$:
1906 027014  012737  000063  001412                MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
1907 027022  012702  001555                        MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
1908 027026  112722  000006                        MOVB    #RMDA,(R2)+
1909 027032  112722  000034                        MOVB    #RMDC,(R2)+
1910 027036  112722  000032                        MOVB    #RMOF,(R2)+
1911 027042  112722  000002                        MOVB    #RMWC,(R2)+
1912 027046  112722  000004                        MOVB    #RMBA,(R2)+
1913 027052  112722  000000                        MOVB    #RMCS1,(R2)+
1914 027056  112722  000200                        MOVB    #200,(R2)+
1915
1916 027062  004737  036004                        JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     027066  000404                                BR      7$              ;GO TO 7$ IF NO ERROR
     027070  000240                                NOP                     ;RETURN HERE IF ERROR
     027072  104000                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     027074  000137  027670                        JMP     24$             ;GO TO 24$ IF ERROR
1917 027100                                  7$:
1918
1919                                         ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
1920 027100  004737  035450                        JSR     PC,GETSTS
1921 027104  004737  036356                        JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
1922
1923 027110  004737  035534                        JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     027114  000404                                BR      8$              ;GO TO 8$ IF NO ERROR
     027116  000240                                NOP                     ;RETURN HERE IF ERROR
     027120  104000                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     027122  000137  027670                        JMP     24$             ;GO TO 24$ IF ERROR
```

```
1924 027126                                    8$:
1925
1926                                           ;VERIFY RESULTS OF WRITE COMMAND
1927 027126  004737  036552                          JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     027132  000405                                  BR      9$              ;GO TO 9$ IF NO ERROR
     027134  000240                                  NOP                     ;RETURN HERE IF ERROR
     027136  104000                                  EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     027140  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027142  000137  027670                          JMP     24$             ;GO TO 24$ IF ERROR
1928 027146                                    9$:
1929 027146  004737  051612                          JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     027152  000405                                  BR      10$             ;GO TO 10$ IF NO ERROR
     027154  000240                                  NOP                     ;RETURN HERE IF ERROR
     027156  104000                                  EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     027160  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027162  000137  027670                          JMP     24$             ;GO TO 24$ IF ERROR
1930 027166                                    10$:
1931 027166  004737  037404                          JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     027172  000405                                  BR      11$             ;GO TO 11$ IF NO ERROR
     027174  000240                                  NOP                     ;RETURN HERE IF ERROR
     027176  104000                                  EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     027200  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027202  000137  027670                          JMP     24$             ;GO TO 24$ IF ERROR
1932 02720c                                    11$:
1933
1934                                           ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
1935 027206  012737  000073  001412                MOV     #RH!GO,RMCS10           ;READ HEADER & DATA COMMAND
1936 027214  012737  102722  001416                MOV     #BUFTWO,RMBA0           ;CHANGE BUS ADDRESS
1937
1938 027222  004737  036004                          JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     027226  000404                                  BR      12$             ;GO TO 12$ IF NO ERROR
     027230  000240                                  NOP                     ;RETURN HERE IF ERROR
     027232  104000                                  EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
     027234  000137  027670                          JMP     24$             ;GO TO 24$ IF ERROR
1939 027240                                    12$:
1940
1941                                           ;WAIT FOR READ TO COMPLETE AND GET STATUS
1942 027240  004737  036356                          JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
1943
1944 027244  004737  035534                          JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
     027250  000404                                  BR      13$             ;GO TO 13$ IF NO ERROR
     027252  000240                                  NOP                     ;RETURN HERE IF ERROR
     027254  104000                                  EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
     027256  000137  027670                          JMP     24$             ;GO TO 24$ IF ERROR
1945 027262                                    13$:
1946
1947                                           ;VERIFY THE RESULTS OF READ OPERATION
1948 027262  004737  036552                          JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     027266  000405                                  BR      14$             ;GO TO 14$ IF NO ERROR
     027270  000240                                  NOP                     ;RETURN HERE IF ERROR
     027272  104000                                  EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     027274  004736                                  JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027276  000137  027670                          JMP     24$             ;GO TO 24$ IF ERROR
1949 027302                                    14$:
1950 027302  032737  020000  027672                BIT     #SSF,25$                ;SHOULD SSE BE SET ?
1951 027310  001037                                  BNE     16$                     ;YES !!
1952 027312  032737  140000  027672                BIT     #MSE!USE,25$            ;SHOULD BSE BE SET ?
```

```
1953 027320  001062                          BNE     18$                 ;YES !!
1954 027322  032737  010000  027672          BIT     #FMT16,25$          ;IS THIS FER ??
1955 027330  001405                          BEQ     20$                 ;NO !!
1956
1957                                 ;VERIFY THAT FER IS SET
1958 027332  032737  000020  001352          BIT     #FER,RMER1I         ;IS FER SET ??
1959 027340  001136                          BNE     22$                 ;YES !!
1960
1961 027342  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     027346  000405                          BR      15$             ;GO TO 15$ IF NO ERROR
     027350  000240                          NOP                     ;RETURN HERE IF ERROR
     027352  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     027354  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027356  000137  027670                  JMP     24$             ;GO TO 24$ IF ERROR
1962 027362                          15$:
1963 027362  013737  001352  001142          MOV     RMER1I,$BDDAT       ;RECEIVED STATUS
1964 027370  013737  001352  001140          MOV     RMER1I,$GDDAT       ;EXPECTED STATUS
1965 027376  052737  000020  001140          BIS     #FER,$GDDAT
1966 027404  104343                          EMT     343
1967 027406  000530                          BR      24$
1968
1969                                 ;VERIFY THAT SSE IS SET
1970 027410                          16$:
1971 027410  032737  000040  001400          BIT     #SSE,RMER2I         ;IS 'SSE' BIT SET ?
1972 027416  001107                          BNE     22$                 ;YES !!
1973
1974 027420  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     027424  000405                          BR      17$             ;GO TO 17$ IF NO ERROR
     027426  000240                          NOP                     ;RETURN HERE IF ERROR
     027430  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     027432  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027434  000137  027670                  JMP     24$             ;GO TO 24$ IF ERROR
1975 027440                          17$:
1976 027440  013737  001400  001142          MOV     RMER2I,$BDDAT       ;GET RECIEVED STATUS
1977 027446  013737  001400  001140          MOV     RMER2I,$GDDAT       ;GET EXPECTED STATUS AND
1978 027454  052737  000040  001140          BIS     #SSE,$GDDAT         ;SET SSE.
1979 027462  104224                          EMT     224
1980 027464  000501                          BR      24$                 ;SKIP REST OF TEST
1981
1982                                 ;VERIFY THAT BSE IS SET
1983 027466                          18$:
1984 027466  032737  100000  001400          BIT     #BSE,RMER2I         ;IS BSE SET ??
1985 027474  001060                          BNE     22$                 ;YES !!
1986
1987 027476  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     027502  000405                          BR      19$             ;GO TO 19$ IF NO ERROR
     027504  000240                          NOP                     ;RETURN HERE IF ERROR
     027506  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     027510  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027512  000137  027670                  JMP     24$             ;GO TO 24$ IF ERROR
1988 027516                          19$:
1989 027516  013737  001400  001142          MOV     RMER2I,$BDDAT       ;RECEIVED STATUS
1990 027524  013737  001400  001140          MOV     RMER2I,$GDDAT       ;EXPECTED STATUS
1991 027532  052737  100000  001140          BIS     #BSE,$GDDAT
1992 027540  104345                          EMT     345
1993 027542  000452                          BR      24$                 ;SKIP REST OF TEST
1994
```

```
1995                                    ;VERIFY THAT HCE IS SET
1996 027544                             20$:
1997 027544  032737  000200  001352             BIT     #HCE,RMER1I             ;IS "HCE" SET??
1998 027552  001031                             BNE     22$                     ;YES!!
1999
2000 027554  004737  051612                     JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     027560  000405                             BR      21$             ;GO TO 21$ IF NO ERROR
     027562  000240                             NOP                     ;RETURN HERE IF ERROR
     027564  104000                             EMT                     ;ERROR # DEFINED BY DTA IS SUBROUTINE
     027566  004736                             JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027570  000137  027670                     JMP     24$             ;GO TO 24$ IF ERROR
2001 027574                             21$:
2002 027574  013737  001352  001142             MOV     RMER1I,$BDDAT           ;RECEIVED STATUS FOR TYPEOUT
2003 027602  013737  001352  001140             MOV     RMER1I,$GDDAT           ;EXPECTED STATUS
2004 027610  052737  000200  001140             BIS     #HCE,$GDDAT
2005 027616  012737  000001  001174             MOV     #1,$TMP0                ;GET HEADER WORD NUMBER
2006 027624  013737  027672  001176             MOV     25$,$TMP1               ;GET FAILING BIT POSITION
2007 027632  104344                             EMT     344
2008 027634  000415                             BR      24$
2009 027636                             22$:
2010
2011                                    ;CHECK FOR OTHER ERRORS
2012 027636  004737  037404                     JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     027642  000405                             BR      23$             ;GO TO 23$ IF NO ERROR
     027644  000240                             NOP                     ;RETURN HERE IF ERROR
     027646  104000                             EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     027650  004736                             JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     027652  000137  027670                     JMP     24$             ;GO TO 24$ IF ERROR
2013 027656                             23$:
2014
2015                                    ;ADVANCE THE BIT POSITION AND FORMAT AGAIN IF NOT DONE
2016 027656  006337  027672                     ASL     25$                     ;SHIFT TO NEXT BIT POSITION
2017 027662  001404                             BEQ     26$                     ;EXIT IF DONE
2018 027664  000137  026642                     JMP     1$                      ;GO DO NEXT SECTOR
2019
2020 027670  000401                     24$:    BR      27$                     ;JUMP TO NEXT TEST
2021 027672  000000                     25$:    .WORD   0                       ;STORAGE FOR BIT POSITION
2022
2023 027674                             26$:
2024
2025 027674                             27$:
2026
2027                                    ;;*****************************************************************
                                        ;*TEST 30       FORMAT HCE, SECOND HEADER WORD
                                        ;;*****************************************************************
     027674                             TST30:
     027674  000004                             SCOPE                   ;SCOPE CALL
     027676  000240                             NOP                     ;START OF TEST
     027700  012706  001100                     MOV     #STACK,SP       ;INITIALIZE STACK POINTER
     027704  013700  001276                     MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
     027710  013701  001466                     MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
     027714  012737  000030  001226             MOV     #30,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
2028
2029 027722  012737  000001  030516             MOV     #1,19$                  ;INIT BIT POSITION
2030
2031                                    ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
2032 027730                             1$:
```

```
2033 027730  012737  001057  001446          MOV     #559.,RMDC0             ;CYLINDER = 559.
2034 027736  012737  001000  001420          MOV     #TA2,RMDA0              ;TRACK = 2, SECTOR = 0
2035 027744  012737  010000  001444          MOV     #FMT16,RMOF0            ;16 BIT FORMAT
2036 027752  012737  177376  001414          MOV     #-258.,RMWC0            ;2 + 256 WORDS (2'S COMP)
2037 027760  012737  101716  001416          MOV     #BUFONE,RMBA0           ;DATA BUFFER ADDRESS
2038 027766  012737  000062  001412          MOV     #WH,RMCS10              ;WRITE HEADER AND DATA
2039
2040                                  ;VERIFY THAT SECTOR IS NOT BAD
     027774  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
     030000  000405                          BR      2$              ;GO TO 2$ IF NO ERROR
     030002  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
     030006  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
     030010  000137  030520                  JMP     21$             ;GO TO 21$ IF ERROR
2041 030014                           2$:
2042 030014  012737  065116  001174          MOV     #ZEROS,$TMP0            ;USE ALL ZEROS DATA PATTERN
2043 030022  012737  000001  001176          MOV     #1,$TMP1
2044 030030  004737  034640                  JSR     PC,GENBUF               ;GO GENERATE DATA BUFFER
2045 030034                           3$:
2046
2047                                  ;PREPARE DEVICE FOR DATA TRANSFER
2048 030034  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
     030040  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                     ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                     ;CLEAR CONTROLLER & SELECT DEVICE
                                                                     ;VERIFY CONTROLLER CLEAR OPERATION
                                                                     ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                     ;VERIFY PACK ACKNOWLEDGE
                                                                     ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                     ;VERIFY RECALIBRATION
     030042  000404                          BR      4$              ;GO TO 4$ IF NO ERROR
     030044  000240                          NOP                     ;RETURN HERE IF ERROR
     030046  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
     030050  000137  030520                  JMP     21$             ;GO TO 21$ IF ERROR
2049
2050                                  ;COMPLEMENT DATA BIT IN SECOND HEADER WORD
2051 030054                           4$:
2052 030054  033737  030516  101720          BIT     19$,BUFONE+2            ;IS BIT IN HEADER ON??
2053 030062  001404                          BEQ     5$              ;NO!!
2054 030064  043737  030516  101720          BIC     19$,BUFONE+2            ;RESET BIT IN HEADER
2055 030072  000403                          BR      6$
2056 030074  053737  030516  101720  5$:     BIS     19$,BUFONE+2            ;SET BIT IN HEADER
2057
2058                                  ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
2059 030102                           6$:
2060 030102  012737  000063  001412          MOV     #WH!GO,RMCS10           ;WRITE HEADER AND DATA
2061 030110  012702  001555                  MOV     #PUTINX,R2              ;WRITE REGISTER INDEX TABLE
2062 030114  112722  000006                  MOVB    #RMDA,(R2)+
2063 030120  112722  000034                  MOVB    #RMDC,(R2)+
2064 030124  112722  000032                  MOVB    #RMOF,(R2)+
2065 030130  112722  000002                  MOVB    #RMWC,(R2)+
2066 030134  112722  000004                  MOVB    #RMBA,(R2)+
2067 030140  112722  000000                  MOVB    #RMCS1,(R2)+
2068 030144  112722  000200                  MOVB    #200,(R2)+
2069
2070 030150  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
     030154  000404                          BR      7$              ;GO TO 7$ IF NO ERROR
     030156  000240                          NOP                     ;RETURN HERE IF ERROR
```

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        030160  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        030162  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
 2071   030166                          7$:
 2072
 2073                                   ;SETUP INPUT REGISTER BUFFER FOR READING STATUS
 2074   030166  004737  035450                  JSR     PC,GETSTS
 2075   030172  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR COMMAND TO COMPLETE
 2076
 2077   030176  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        030202  000404                          BR      8$              ;GO TO 8$ IF NO ERROR
        030204  000240                          NOP                     ;RETURN HERE IF ERROR
        030206  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        030210  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
 2078   030214                          8$:
 2079
 2080                                   ;VERIFY RESULTS OF WRITE COMMAND
 2081   030214  004737  036552                  JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
        030220  000405                          BR      9$              ;GO TO 9$ IF NO ERROR
        030222  000240                          NOP                     ;RETURN HERE IF ERROR
        030224  104000                          EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
        030226  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        030230  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
 2082   030234                          9$:
 2083   030234  004737  051612                  JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
        030240  000405                          BR      10$             ;GO TO 10$ IF NO ERROR
        030242  000240                          NOP                     ;RETURN HERE IF ERROR
        030244  104000                          EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
        030246  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        030250  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
 2084   030254                          10$:
 2085   030254  004737  037404                  JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
        030260  000405                          BR      11$             ;GO TO 11$ IF NO ERROR
        030262  000240                          NOP                     ;RETURN HERE IF ERROR
        030264  104000                          EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
        030266  004736                          JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
        030270  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
 2086   030274                          11$:
 2087
 2088                                   ;READ HEADER AND DATA FOR SECTOR JUST WRITTEN
 2089   030274  012737  000073  001412          MOV     #RH!GO,RMCS10           ;READ HEADER & DATA COMMAND
 2090   030302  012737  102722  001416          MOV     #BUFTWO,RMBA0           ;CHANGE BUS ADDRESS
 2091
 2092   030310  004737  036004                  JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
        030314  000404                          BR      12$             ;GO TO 12$ IF NO ERROR
        030316  000240                          NOP                     ;RETURN HERE IF ERROR
        030320  104000                          EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
        030322  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
 2093   030326                          12$:
 2094
 2095                                   ;WAIT FOR READ TO COMPLETE AND GET STATUS
 2096   030326  004737  036356                  JSR     PC,TIMOUT               ;WAIT FOR READ TO COMPLETE
 2097
 2098   030332  004737  035534                  JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
        030336  000404                          BR      13$             ;GO TO 13$ IF NO ERROR
        030340  000240                          NOP                     ;RETURN HERE IF ERROR
        030342  104000                          EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
        030344  000137  030514                  JMP     18$             ;GO TO 18$ IF ERROR
```

```
2099 030350                                    13$:
2100
2101                                           ;VERIFY THE RESULTS OF READ OPERATION
2102 030350  004737  036552                        JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
     030354  000405                                BR      14$             ;GO TO 14$ IF NO ERROR
     030356  000240                                NOP                     ;RETURN HERE IF ERROR
     030360  104000                                EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
     030362  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     030364  000137  030514                        JMP     18$             ;GO TO 18$ IF ERROR
2103 030370                                    14$:
2104
2105                                           ;VERIFY THAT HEADER COMPARE ERROR IS SET
2106 030370  032737  000200  001352                BIT     #HCE,RMER1I             ;IS "HCE" SET??
2107 030376  001031                                BNE     16$                     ;YES!!
2108
2109 030400  004737  051612                        JSR     PC,DTASTS       ;GO VERIFY RESULTS OF DATA TRANSFER
     030404  000405                                BR      15$             ;GO TO 15$ IF NO ERROR
     030406  000240                                NOP                     ;RETURN HERE IF ERROR
     030410  104000                                EMT                     ;ERROR # DEFINED BY DTASTS SUBROUTINE
     030412  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     030414  000137  030514                        JMP     18$             ;GO TO 18$ IF ERROR
2110 030420                                    15$:
2111 030420  013737  001352  001142                MOV     RMER1I,$BDDAT           ;RECEIVED STATUS FOR TYPEOUT
2112 030426  013737  001352  001140                MOV     RMER1I,$GDDAT           ;EXPECTED STATUS
2113 030434  052737  000200  001140                BIS     #HCE,$GDDAT
2114 030442  012737  000002  001174                MOV     #2,$TMP0                ;GET HEADER WORD NUMBER
2115 030450  013737  030516  001176                MOV     19$,$TMP1               ;GET FAILING BIT POSITION
2116 030456  104344                                EMT     344
2117 030460  000415                                BR      18$
2118 030462                                    16$:
2119
2120                                           ;CHECK FOR OTHER ERRORS
2121 030462  004737  037404                        JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
     030466  000405                                BR      17$             ;GO TO 17$ IF NO ERROR
     030470  000240                                NOP                     ;RETURN HERE IF ERROR
     030472  104000                                EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
     030474  004736                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
     030476  000137  030514                        JMP     18$             ;GO TO 18$ IF ERROR
2122 030502                                    17$:
2123
2124                                           ;ADVANCE THE BIT POSITION AND FORMAT NEXT SECTOR IF NOT DONE
2125 030502  006337  030516                        ASL     19$                     ;SHIFT TO NEXT BIT POSITION
2126 030506  001404                                BEQ     20$                     ;EXIT IF DONE
2127 030510  000137  027730                        JMP     1$                      ;GO DO NEXT SECTOR
2128
2129 030514  000401                            18$:    BR      21$                     ;JUMP OVER STORAGE
2130 030516  000000                            19$:    .WORD   0                       ;STORAGE FOR BIT POSITION
2131
2132 030520                                    20$:
2133
2134 030520                                    21$:
2135
2136                                           ;;*******************************************************************
                                               ;*TEST 31       FORMAT FE CYLINDERS
                                               ;;*******************************************************************
     030520                                    TST31:
     030520  000004                                SCOPE                   ;SCOPE CALL
```

```
        030522  000240                          NOP                     ;START OF TEST
        030524  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK POINTER
        030530  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
        030534  013701  001466                  MOV     TSTQUE,R1       ;(R1) = DEVICE BEING TESTED
        030540  012737  000001  001206          MOV     #1,$TIMES       ;;DO 1 ITERATION
        030546  012737  000031  001226          MOV     #31,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
  2137
  2138                                  ;SETUP PARAMETERS FOR GENERATING DATA BUFFER
  2139  030554  012737  001057  001446          MOV     #559.,RMDC0     ;CYLINDER = 559.
  2140  030562  012737  001000  001420          MOV     #TA2,RMDA0      ;TRACK = 2, SECTOR = 0
  2141  030570                                1$:
  2142  030570  012737  011000  001444          MOV     #FMT16!SSEI,RMOF0       ;16 BIT FORMAT WITH SSEI SET
  2143  030576  012737  177776  001414          MOV     #-2,RMWC0       ;2 WORDS (2'S COMP)
  2144  030604  012737  101716  001416          MOV     #BUFONE,RMBA0   ;DATA BUFFER ADDRESS
  2145  030612  012737  000062  001412          MOV     #WH,RMCS10      ;WRITE HEADER AND DATA
  2146
  2147                                  ;VERIFY THAT SECTOR IS NOT BAD
        030620  004737  032406                  JSR     PC,BADSCT       ;CALL BAD SECTOR MODULE
        030624  000405                          BR      2$              ;GO TO 2$ IF NO ERROR
        030626  104401  063446                  TYPE    ,SCTMSG         ;TYPE BAD SECTOR MESSAGE
        030632  104000                          EMT                     ;ERROR # DEFINED BY BADSCT SUBROUTINE
        030634  000137  031146                  JMP     12$             ;GO TO 12$ IF ERROR
  2148  030640                                2$:
  2149  030640  023727  001446  001060          CMP     RMDC0,#560.     ;IS DESIRED CYLINDER, OUTSIDE FE CYLINDERS ?
  2150  030646  101402                          BLOS    3$              ;NO !!
  2151  030650  000137  031146                  JMP     12$             ;YES, EXIT TEST
  2152  030654                                3$:
  2153  030654  004737  034640                  JSR     PC,GENBUF       ;GO GENERATE DATA BUFFER
  2154  030660                                4$:
  2155  030660  005737  001514                  TST     SSFENB          ;TEST SSF ENABLE FOR 1ST HEADER WORD
  2156  030664  001403                          BEQ     5$              ;NO, DO NOT SET "SSF"
  2157  030666  052737  020000  101716          BIS     #SSF,BUFONE     ;YES, SET SSF BIT
  2158  030674                                5$:
  2159
  2160                                  ;PREPARE DEVICE FOR DATA TRANSFER
  2161  030674  004737  031456                  JSR     PC,TSTPRP       ;PREPARE DEVICE FOR TEST
        030700  154130                          .WORD   154130          ;TASK DESCRIPTOR AS FOLLOWS:
                                                                        ;SELECT DEVICE & VERIFY DEVICE AVAILABLE
                                                                        ;CLEAR CONTROLLER & SELECT DEVICE
                                                                        ;VERIFY CONTROLLER CLEAR OPERATION
                                                                        ;PACK ACKNOWLEDGE IF VOLUME NOT VALID
                                                                        ;VERIFY PACK ACKNOWLEDGE
                                                                        ;RECALIBRATE IF "SKI" OR "PIP" IS SET
                                                                        ;VERIFY RECALIBRATION
        030702  000404                          BR      6$              ;GO TO 6$ IF NO ERROR
        030704  000240                          NOP                     ;RETURN HERE IF ERROR
        030706  104000                          EMT                     ;ERROR # DEFINED BY TSTPRP SUBROUTINE
        030710  000137  031146                  JMP     12$             ;GO TO 12$ IF ERROR
  2162
  2163                                  ;SETUP AND EXECUTE WRITE HEADER AND DATA COMMAND
  2164  030714                                6$:
  2165  030714  012737  000063  001412          MOV     #WH!GO,RMCS10   ;WRITE HEADER AND DATA
  2166  030722  012702  001555                  MOV     #PUTINX,R2      ;WRITE REGISTER INDEX TABLE
  2167  030726  112722  000006                  MOVB    #RMDA,(R2)+
  2168  030732  112722  000034                  MOVB    #RMDC,(R2)+
  2169  030736  112722  000032                  MOVB    #RMOF,(R2)+
  2170  030742  112722  000002                  MOVB    #RMWC,(R2)+
```

```
                                                MOVB    #RMBA,(R2)+
                                                MOVB    #RMCS1,(R2)+
                                                MOVB    #200,(R2)+

                                                JSR     PC,PUT          ;GO WRITE REGISTER(S) WITH PUT SUBROUTINE
                                                BR      7$              ;GO TO 7$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY PUT SUBROUTINE
                                                JMP     12$             ;GO TO 12$ IF ERROR
                                        7$:

                                        ;SETUP GET INDEX TABLE TO READ ALL REGISTERS
                                                JSR     PC,GETSTS       ;GO TO GETSTS SUBROUTINE

                                        ;WAIT FOR COMMAND TO COMPLETE
                                                JSR     PC,TIMOUT       ;GO TO TIMOUT SUBROUTINE

                                                JSR     PC,GET          ;GO READ REGISTER(S) WITH GET SUBROUTINE
                                                BR      8$              ;GO TO 8$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY GET SUBROUTINE
                                                JMP     12$             ;GO TO 12$ IF ERROR
                                        8$:

                                        ;VERIFY RESULTS OF WRITE COMMAND
                                                JSR     PC,PRIERR       ;GO CHECK FOR PRIMARY ERRORS
                                                BR      9$              ;GO TO 9$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY PRIERR SUBROUTINE
                                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                                                JMP     12$             ;GO TO 12$ IF ERROR
                                        9$:
                                                JSR     PC,SECERR       ;GO CHECK FOR SECONDARY ERRORS
                                                BR      10$             ;GO TO 10$ IF NO ERROR
                                                NOP                     ;RETURN HERE IF ERROR
                                                EMT                     ;ERROR # DEFINED BY SECERR SUBROUTINE
                                                JSR     PC,@(SP)+       ;GO BACK FOR MORE ERROR CHECKS
                                                JMP     12$             ;GO TO 12$ IF ERROR
                                        10$:

                                        ;INCREMENT ADDRESS
                                                INC     RMDA0           ;ADVANCE SECTOR COUNT
                                                CMPB    RMDA0,#31.      ;DONE ALL SECTORS ?
                                                BLOS    11$             ;NO !!

                                                CLRB    RMDA0           ;START AT SECTOR 0 AND
                                                INCB    RMDA0+1         ;ADVANCE TO NEXT TRACK.
                                                CMPB    RMDA0+1,LSTRK+1 ;DONE WITH LAST TRACK ?
                                                BLOS    11$             ;NO !!

                                                CLRB    RMDA0+1         ;START WITH TRACK 0 AND
                                                INC     RMDC0           ;ADVANCE TO NEXT CYLINDER.
                                                CMP     RMDC0,#560.     ;DONE WITH LAST CYLINDER ?
                                                BHI     12$             ;YES !!
                                        11$:    JMP     1$              ;GO DO TEST AGAIN

                                        12$:
```

```
END OF SUB-PASS ROUTINE

                                        .SBTTL  END OF SUB-PASS ROUTINE
                                        ;
                                        ;THIS IS THE END OF SUB-PASS ROUTINE. THIS ROUTINE IS USED TO
                                        ;TERMINATE THE OPERATION OF THE CURRENT DEVICE UNDER TEST AND
                                        ;SELECT THE NEXT DEVICE FOR TEST. IF THERE ARE NO MORE DEVICES
                                        ;TO TEST, EXIT IS MADE TO '$EOP' ROUTINE. OTHERWISE, RETURN
                                        ;IS MADE TO 'SHUT' ROUTINE.
                                        ;
031146  000004                  $EOSP:  SCOPE
031150  000240                          NOP
031152  013700  001466                  MOV     TSTQUE,R0       ;GET POINTER TO TSTQUE
031156  062700  000002                  ADD     #2,R0           ;ADJUST POINTER TO NEXT DEVICE
031162  010037  001466                  MOV     R0,TSTQUE       ;SAVE POINTER TO TSTQUE
031166  005710                          TST     (R0)            ;ANY MORE DEVICES FOR TEST ?
031170  001402                          BEQ     1$              ;BR IF NO
031172  000137  031422                  JMP     SHUT            ;YES, JUMP TO 'SHUT' ROUTINE
031176  012737  001470  001466  1$:     MOV     #TSTQUE+2,TSTQUE        ;INITIALIZE POINTER TO FIRST DEVICE IN
                                                                ;TEST QUE TABLE

                                        .SBTTL  END OF PASS ROUTINE

                                        ;;**************************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*TYPE "END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYY"
                                        ;*WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO SHUT

031204                          $EOP:
031204  000240                          NOP
031206  005037  001116                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
031212  005037  001206                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
031216  005237  001230                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
031222  042737  100000  001230          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
031230  005327                          DEC     (PC)+           ;;LOOP?
031232  000001                  $EOPCT: .WORD   1
031234  003066                          BGT     $DOAGN          ;;YES
031236  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
031240  000001                  $ENDCT: .WORD   1
031242  031232                          $EOPCT
031244  104401  031252                  TYPE    ,65$            ;;TYPE ASCIZ STRING
031250  000407                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <12><15>/END PASS #/
031270                          64$:
031270  013746  001230                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                                                ;;TYPE PASS NUMBER
031274  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
031276  005737  001126                  TST     $ERTTL          ;;SEE IF ANY ERRORS THIS PASS
031302  001431                          BEQ     $GT42P          ;;BR IF NO ERRORS TO REPORT
031304  104401  031312                  TYPE    ,67$            ;;TYPE ASCIZ STRING
031310  000421                          BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  /  TOTAL ERRORS SINCE LAST REPORT /
031354                          66$:
031354  013746  001126                  MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
                                                                ;;TOTAL NUMBER OF ERRORS
031360  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
031362  005037  001126                  CLR     $ERTTL          ;;CLEAR ERROR TOTAL
```

END OF PASS ROUTINE

```
        031366  104401  001217          $GT42P: TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
        031372  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
        031376  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
        031400  000005                          RESET                   ;;CLEAR THE WORLD
        031402  004?10                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
        031404  000240                          NOP                     ;;SAVE ROOM
        031406  000240                          NOP                     ;;FOR
        031410  000240                          NOP                     ;;ACT11
        031412                          $DOAGN:
        031412  000137                          JMP     @(PC)+          ;;RETURN
        031414  031422                  $RTNAD: .WORD   SHUT
        031416     377     377     000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
                                                .EVEN
    21
    22 031422  005737  001326          SHUT:   TST     CTLFG           ;WAS CONTROL C FLAGGED ?
    23 031426  001002                          BNE     1$              ;BR IF YES
    24 031430  000137  007524                  JMP     READY           ;CONTINUE
    25 031434  005737  000042          1$:     TST     @#42            ;ANY MONITOR PRESENT ?
    26 031440  001002                          BNE     2$              ;BR IF YES
    27 031442  000137  005434                  JMP     START           ;GO TO START
    28 031446  005037  001300          2$:     CLR     $DEVM           ;FUDGE NO DRIVES
    29 031452  000137  031204                  JMP     $EOP            ;RETURN TO $EOP
```

```
                        .SBTTL  TEST PREPARATION MODULE

                        ; THIS MODULE PREPARES THE SUBSYSTEM FOR THE EXECUTION OF A TEST,
                        ; REPORTING AN ERROR TO THE USER IF AN ERROR IS  DETECTED.  THE USER
                        ; SPECIFIES TASKS TO BE PERFORMED, WHICH THE MODULE EXECUTES
                        ; USING SUBROUTINES.

                        ;CALL:
                        ;       JSR     PC,TSTPRP
                        ;       .WORD   NNNNNN          TASK/VERIFY DESCRIPTOR
                        ;       BR      ??              RETURN HERE IF NO ERROR
                        ;       NOP                     RETURN HERE IF ERROR
                        ;       ERROR                   ERROR DEFINED BY MODULE

                        ;TASK/VERIFY DESCRIPTOR
                        ;       BIT 15 = 1      SELECT DEVICE AND VERIFY DEVICE IS AVAILABLE
                        ;       ----------
                        ;       BIT 14 = 1      CLEAR CONTROLLER AND SELECT DEVICE
                        ;       BIT 13          (RESERVED FOR DRIVE CLEAR)
                        ;       BIT 12 = 1      PACK ACKNOWLEDGE IF VOLUME NOT VALID
                        ;       ----------
                        ;       BIT 11 = 1      RECALIBRATE IF POSITIONING IN PROGRESS OR SKI ERROR
                        ;       BIT 10 = 1      RECALIBRATE DRIVE
                        ;       BIT 9
                        ;       ----------
                        ;       BIT 8
                        ;       BIT 7
                        ;       BIT 6  = 1      VERIFY CONTROLLER CLEAR OPERATION
                        ;       ----------
                        ;       BIT 5           (RESERVED FOR DRIVE CLEAR)
                        ;       BIT 4  = 1      VERIFY PACK ACKNOWLEDGE
                        ;       BIT 3  = 1      VERIFY RECALIBRATION
                        ;       ----------
                        ;       BIT 2
                        ;       BIT 1
                        ;       BIT 0

031456                  TSTPRP:

                        ;STORE TASK DESCRIPTOR AND CLEAR USER'S ERROR CALL
031456  017637  000000  032402          MOV     @(SP),39$       ;STORE DESCRIPTOR
031464  062716  000006                  ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
031470  105076  000000                  CLRB    @(SP)           ;CLEAR ERROR CALL
031474  162716  000004                  SUB     #4,(SP)         ;MOVE SP TO NO ERROR RETURN

031500  004737  035450                  JSR     PC,GETSTS       ;SETUP TO READ ALL REGISTERS
031504  004737  035534                  JSR     PC,GET          ;GET RMER2
031510  000411                          BR      2$              ;BR IF NO ERROR DETECTED
031512  000401                          BR      1$              ;GET OVER ERROR NUMBER
031514  000000                          .WORD   0               ;ERROR DEFINED BY GET SUBROUTINE
031516  062716  000004          1$:     ADD     #4,(SP)         ;XFER ERROR TO USER AND
031522  113776  031514  000000          MOVB    1$-2,@(SP)      ;GET ERROR NUMBER.
031530  000137  032372                  JMP     37$

031534  013737  001400  032404  2$:     MOV     RMER21,40$      ;GET RMER2 AND SAVE FOR LATER

                        ;;*****************************************************************************
```

```
                                        ;SELECT DEVICE AND VERIFY DEVICE AVAILABLE IF BIT 15 SET IN TASK
031542  005737  032402                          TST     39$             ;SELECT DEVICE??
031546  100014                                  BPL     4$              ;NO!!

031550  004737  043762                          JSR     PC,DEVSEL       ;GO SELECT DEVICE
031554  000411                                  BR      4$              ;NO ERROR - CONTINUE
031556  000401                                  BR      3$
031560  000000                                  .WORD   0               ;ERROR NUMBER FROM DEVSEL
031562  062716  000004          3$:             ADD     #4,(SP)         ;TRANSFER ERROR TO USER
031566  113776  031560  000000                  MOVB    3$-2,@(SP)
031574  000137  032372                          JMP     37$

                                        ;;**************************************************************************
                                        ;CLEAR CONTROLLER IF BIT 14 IS SET IN TASK
031600                                  4$:
031600  032737  040000  032402                  BIT     #BIT14,39$      ;CLEAR CONTROLLER??
031606  001451                                  BEQ     13$             ;NO!!

031610  004737  045454                          JSR     PC,CNTCLR       ;GO CLEAR CONTROLLER
031614  000411                                  BR      7$              ;CONTINUE - NO ERROR
031616  000401                                  BR      6$
031620  000000                          5$:     .WORD   0               ;ERROR NUMBER FROM CNTCLR
031622  062716  000004                  6$:     ADD     #4,(SP)         ;TRANSFER ERROR TO USER
031626  113776  031620  000000                  MOVB    5$,@(SP)
031634  000137  032372                          JMP     37$

                                        ;;**************************************************************************
                                        ;VERIFY CONTROLLER CLEAR IF BIT6 SET IN TASK
031640                                  7$:
031640  032737  000100  032402                  BIT     #BIT6,39$       ;VERIFY??
031646  001431                                  BEQ     13$             ;NO!!

031650  004737  035534                          JSR     PC,GET          ;GO GET STATUS
031654  000411                                  BR      10$             ;NO ERROR GETTING STATUS
031656  000401                                  BR      9$
031660  000000                          8$:     .WORD   0               ;ERROR FROM GETTING STATUS
031662  062716  000004                  9$:     ADD     #4,(SP)         ;TRANSFER ERROR TO USER
031666  113776  031660  000000                  MOVB    8$,@(SP)
031674  000137  032372                          JMP     37$

031700  004737  045572                  10$:    JSR     PC,CLRSTS       ;GO VERIFY STATUS CLEAR
031704  000412                                  BR      13$             ;NO ERROR IN CLEAR
031706  000401                                  BR      12$
031710  000000                          11$:    .WORD   0               ;ERROR IN STATUS CLEAR
031712  005726                          12$:    TST     (SP)+           ;STRIP RETURN ADDRESS TO
031714  062716  000004                          ADD     #4,(SP)         ;SUBROUTINE AND TRANSFER
031720  113776  031710  000000                  MOVB    11$,@(SP)       ;ERROR TO USER
031726  000137  032372                          JMP     37$

                                        ;;**************************************************************************
                                        ;EXECUTE PACK ACKNOWLEDGE IF BIT12 SET IN TASK AND VOLUME IS
                                        ;NOT VALID
031732                                  13$:
031732  032737  010000  032402                  BIT     #BIT12,39$      ;PACK ACKNOWLEDGE??
031740  001501                                  BEQ     25$             ;NO!!

031742  004737  035534                          JSR     PC,GET
```

```
                                        BR      16$             ;NO ERROR GETTING RMDS
                                        BR      15$
                                14$:    .WORD   0
                                15$:    ADD     #4,(SP)         ;TRANSFER ERROR TO USER
                                        MOVB    14$,@(SP)
                                        JMP     37$

                                16$:    BIT     #VV,RMDSI       ;IS VOLUME VALID??
                                        BNE     25$             ;YES!!

                                        MOV     #PAKACK!GO,RMCS1O       ;LOAD PACK ACK COMMAND
                                        MOVB    #RMCS1,PUTINX   ;SETUP REGISTER INDEX TABLE
                                        MOVB    #200,PUTINX+1
                                        JSR     PC,PUT          ;GO WRITE COMMAND
                                        BR      19$             ;NO ERROR LOADING REGISTER
                                        BR      18$
                                17$:    .WORD   0               ;ERROR FROM PUT SUB
                                18$:    ADD     #4,(SP)         ;TRANSFER ERROR TO USER
                                        MOVB    17$,@(SP)
                                        BR      37$

                                19$:    JSR     PC,TIMOUT       ;WAIT FOR COMMAND TO COMPLETE

                                ;;********************************************************** ********
                                ;VERIFY PACK ACKNOWLEDGE IF #BIT4 SET IN TASK
                                        BIT     #BIT4,39$       ;VERIFY PACK ACKNOWLEDGE??
                                        BEQ     25$             ;NO!!

                                        JSR     PC,GET          ;GO GET STATUS
                                        BR      22$             ;NO ERROR GETTING STATUS
                                        BR      21$
                                20$:    .WORD   0               ;ERROR FROM GFT SUB
                                21$:    ADD     #4,(SP)         ;TRANSFER ERROR TO USER
                                        MOVB    20$,@(SP)
                                        BR      37$

                                22$:    JSR     PC,ACKSTS       ;GO CHECK ACKNOWLEDGE
                                        BR      25$             ;NO ERROR
                                        BR      24$
                                23$:    .WORD   0               ;PACK ACKNOWLEDGE ERROR
                                24$:    TST     (SP)+           ;STRIP RETURN TO SUB AND
                                        ADD     #4,(SP)         ;TRANSFER ERROR TO USER
                                        MOVB    23$,@(SP)
                                        BR      37$

                                ;;*****************************************************************
                                ;RECALIBRATE DRIVE IF BIT 11 IS SET IN TASK AND "SKI" IS SET
                                ;OR "PIP" IS ACTIVE.
                                ;RECALIBRATE DRIVE IF BIT 10 IS SET
                                25$:
                                        BIT     #BIT10,39$      ;RECALIBRATE DRIVE ?
                                        BNE     29$             ;YES!!
                                        BIT     #BIT11,39$      ;RECALIBRATE??
                                        BEQ     38$             ;NO!!

                                        JSR     PC,GET          ;GO GET RMDS
                                        BR      28$             ;NO ERROR GETTING RMDS
```

```
                                        BR      27$
032174  000000                  26$:    .WORD   0               ;ERROR FROM GET SUB
032176  062716  000004          27$:    ADD     #4,(SP)         ;TRANSFER ERROR TO USER
032202  113776  032174  000000          MOVB    26$,@(SP)
032210  000470                          BR      37$

032212  032737  040000  032404  28$:    BIT     #SKI,40$        ;WAS SKI SET ?
032220  001004                          BNE     29$             ;YES, GO RECALIBRATE
032222  032737  020000  001350          BIT     #PIP,RMDSI      ;IS PIP ACTIVE??
032230  001462                          BEQ     38$             ;NO!!

032232  012737  000007  001412  29$:    MOV     #RECAL!GO,RMCS10        ;LOAD RECALIBRATE COMMAND
032240  112737  000000  001555          MOVB    #RMCS1,PUTINX   ;AND REGISTER INDEX
032246  112737  000200  001556          MOVB    #200,PUTINX+1   ;SET TERMINATOR
032254  004737  036004                  JSR     PC,PUT          ;GO ISSUE RECALIBRATE
032260  000410                          BR      31$             ;NO ERROR
032262  000401                          BR      30$
032264  000000                          .WORD   0               ;ERROR IN REGISTER TRANSFER
032266  062716  000004          30$:    ADD     #4,(SP)         ;TRANSFER ERROR TO USER
032272  113776  032264  000000          MOVB    30$-2,@(SP)
032300  000434                          BR      37$

032302  004737  036356          31$:    JSR     PC,TIMOUT       ;WAIT FOR COMPLETION

                                ;;**********************************************************************
                                ;VERIFY RECALIBRATE IF BIT 3 SET IN TASK
032306  032737  000010  032402          BIT     #BIT3,39$       ;VERIFY RECALIBRATE??
032314  001430                          BEQ     38$             ;NO!!

032316  004737  035534                  JSR     PC,GET          ;GO GET STATUS
032322  000410                          BR      34$             ;NO ERROR GETTING STATUS
032324  000401                          BR      33$
032326  000000                  32$:    .WORD   0               ;ERROR FROM GET
032330  062716  000004          33$:    ADD     #4,(SP)         ;TRANSFER ERROR TO USER
032334  113776  032326  000000          MOVB    32$,@(SP)
032342  000413                          BR      37$

032344  004737  047246          34$:    JSR     PC,RCLSTS       ;GO CHECK RECALIBRATE
032350  000412                          BR      38$             ;NO ERROR DURING RECALIBRATE
032352  000401                          BR      36$
032354  000000                  35$:    .WORD   0               ;ERROR DURING RECALIBRATE
032356  005726                  36$:    TST     (SP)+           ;STRIP RETURN TO SUB AND
032360  062716  000004                  ADD     #4,(SP)         ;TRANSFER ERROR TO USER
032364  113776  032354  000000          MOVB    35$,@(SP)
032372  162716  000002          37$:    SUB     #2,(SP)         ;MOVE SP BACK BEFORE ERROR
032376  000240                  38$:    NOP
032400  000207                          RTS     PC              ;RETURN TO USER

032402  000000                  39$:    .WORD   0               ;TASK/VERIFY DESCRIPTOR
032404  000000                  40$:    .WORD   0               ;CONTAINS RMER2
```

```
                        .SBTTL  BAD SECTOR MODULE

                        ;THE MODULE IS INTENDED TO BE CALLED PRIOR TO CALLING THE BUFFER
                        ;GENERATOR SUBROUTINE, AND PRESERVES THE "PUT BUFFER" SO THAT THE
                        ;BUFFER NEED ONLY BE FILLED ONCE FOR THE EXECUTION OF A FORMAT
                        ;OPERATION.
                        ;
                        ;THE MODULE RETURNS TO THE CALLING TEST WITH THE APPROVED OR ASSIGNED
                        ;SECTOR IN THE PUT BUFFER AND ALSO IN LOCATIONS "ASNDA" AND "ASNDC"
                        ;SO THAT A REFERENCE IS AVAILABLE TO THE TEST OUTSIDE OF THE PUT BUFFER.
                        ;
                        ;THE BAD SECTOR MODULE PERFORMS TWO MAJOR FUNCTIONS:
                        ;  (1)  RECOVER THE BAD SECTOR FILES AND
                        ;  (2)  APPROVE THE USAGE OF A SECTOR BASED ON INFORMATION IN
                        ;       THE BAD SECTOR FILES OR ASSIGN A NEW SECTOR IF THE ONE
                        ;       ELECTED IS NOT AVAILABLE FOR USE.
                        ;
                        ;INFORMATION REQUIRED BY THE MODULE INCLUDES:
                        ;  (1)  .RMDCO - THE DESIRED CYLINDER,
                        ;  (2)  .RMDAC - THE TRACK AND SECTOR ADDRESS,
                        ;  (3)  .RMWCO - THE WORD COUNT,
                        ;  (4)  .RMCS10 - THE COMMAND,
                        ;  (5)  .RMOFO - THE FORMAT MODE AND SKIP SECTOR ERROR INHIBIT.
                        ;
                        ;CALL:
                        ;       JSR     PC,BADSCT       ;CALL SUBROUTINE
                        ;       BR      ???             ;RETURN HERE IF NO ERROR
                        ;       TYPE    ,MESSAGE        ;RETURN HERE IF THE BAD SECTOR FILE
                        ;                               ;CANNOT BE RECOVERED.
                        ;       ERROR   N               ;THE EMT OFFSET NUMBER 'N' IS DEFINED
                        ;                               ;BY BAD SECTOR MODULE.
                        ;
032406  062716  000006  BADSCT: ADD     #6,(SP)         ;CLEAR ERROR NUMBER IN USER'S
032412  105076  000000          CLRB    @(SP)           ;ERROR CALL.
032416  162716  000006          SUB     #6,(SP)
                        ;
                        ;TEST "MEDIA ENABLE" TO DETERMINE WHETHER OR NOT THE BAD SECTOR FILES
                        ;HAVE BEEN RECOVERED.
032422  005737  001512          TST     MEDENB          ;HAVE BAD SECTOR FILES BEEN RECOVERED ?
032426  001402                  BEQ     1$              ;BR IF NO
032430  000137  033764          JMP     56$             ;YES, BAD SECTOR FILE IS AVAILABLE
                        ;
                        ;RECOVER SKIP SECTOR FILE FROM CYLINDER = 559., TRACK = 0 AND
                        ;RECOVER THE MANUFACTURES / USERS BAD SECTOR FILE FROM CYLINDER = 558.,
                        ;TRACK = LAST TRACK (RM80 = 13.). ALSO, SAVE THE USER'S PUT BUFFER
032434                  1$:
032434  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
032436  005000                  CLR     R0              ;START WITH RMCS1
032440  016060  001412  101716  2$:     MOV     PUTBUF(R0),BUFFER(R0)
032446  062700  000002          ADD     #2,R0           ;ADVANCE TO NEXT BUFFER POSITION
032452  022700  000046          CMP     #46,R0          ;END OF BUFFER
032456  103370                  BHIS    2$              ;NO !!
                        ;
                        ;SET RETRY COUNT AND LOAD PUT BUFFER AND REGISTER INDEX TABLE
                        ;SETUP PARAMETERS TO READ SKIP SECTOR FILE FIRST (3 SECTORS)
032460  012737  000003  034500          MOV     #3,74$          ;RETRY COUNT
032466  012737  001057  001446          MOV     #559.,RMDCO     ;DESIRED CYLINDER = 559.
```

```
     57 032474  012737  000000  001420          MOV     #0,RMDAQ        ;STARTING TRACK = 0, SECTOR = 0
     58 032502  012737  176372  001414          MOV     #-258.*3,RMWCO  ;258. * 3 SECTORS (2'S COMP)
     59 032510  012737  010000  001444          MOV     #FMT16,RMOFO    ;16 BIT FORMAT
     60 032516  012737  102722  001416          MOV     #BUFTWO,RMBAO   ;SETUP BUS ADDRESS TO READ SKIP SECTOR FILE
     61
     62 032524  012700  001555                  MOV     #PUTINX,R0      ;R0 POINTS TO REGISTER INDEX TABLE
     63 032530  112720  000006                  MOVB    #RMDA,(R0)+
     64 032534  112720  000034                  MOVB    #RMDC,(R0)+
     65 032540  112720  000002                  MOVB    #RMWC,(R0)+
     66 032544  112720  000032                  MOVB    #RMOF,(R0)+
     67 032550  112720  000004                  MOVB    #RMBA,(R0)+
     68 032554  112720  000000                  MOVB    #RMCS1,(R0)+
     69 032560  112720  000200                  MOVB    #200,(R0)+
     70 032564  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
     71
     72                             ;SET GET INDEX TABLE FOR READING STATUS
     73 032566                      3$:
     74 032566  004737  035450                  JSR     PC,GETSTS       ;SETUP GET INDEX REGISTER FOR STATUS
     75 032572  004737  035534                  JSR     PC,GET          ;GET REGISTERS
     76 032576  000411                          BR      5$              ;BR IF NO ERROR
     77 032600  000401                          BR      4$              ;JUMP OVER ERROR NUMBER
     78 032602  000000                          .WORD   0               ;ERROR DEFINED BY GET SUB
     79 032604  062716  000006          4$:     ADD     #6,(SP)         ;XFER ERROR TO USER AND
     80 032610  113776  032602  000000          MOVB    4$-2,@(SP)      ;GET ERROR NUMBER.
     81 032616  000137  033412                  JMP     42$
     82
     83 032622  013737  001400  034512  5$:     MOV     RMER2I,79$      ;GET RMER2 AND SAVE FOR LATER
     84
     85                             ;CLEAR THE DEVICE USING DRIVE CLEAR COMMAND
     86 03263C  012737  000011  001412          MOV     #DRVCLR!GO,RMCS10       ;LOAD COMMAND IN PUT BUFFER
     87 032636  004737  036004                  JSR     PC,PUT          ;OUTPUT COMMAND
     88 032642  000411                          BR      8$              ;RETURN HERE IF NO ERROR
     89 032644  000401                          BR      7$              ;GET AROUND ERROR #
     90 032646  000000                  6$:     .WORD   0               ;ERROR # GOES HERE
     91 032650  062716  000006          7$:     ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
     92 032654  113776  032646  000000          MOVB    6$,@(SP)        ;MOVE ERROR NUMBER TO USER
     93 032662  000137  033412                  JMP     42$
     94
     95 032666  004737  036356          8$:     JSR     PC,TIMOUT       ;WAIT FOR COMPLETION
     96 032672  004737  035534                  JSR     PC,GET          ;GO GET STATUS
     97 032676  000411                          BR      11$             ;RETURN HERE IF NO ERROR
     98 032700  000401                          BR      10$             ;GET AROUND ERROR #
     99 032702  000000                  9$:     .WORD   0               ;ERROR # GOES HERE
    100 032704  062716  000006          10$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
    101 032710  113776  032702  000000          MOVB    9$,@(SP)        ;MOVE ERROR # TO USERS ERROR CALL
    102 032716  000137  033412                  JMP     42$
    103
    104 032722  004737  C51010          11$:    JSR     PC,DRVSTS       ;GO VERIFY DRIVE CLEAR COMMAND
    105 032726  000412                          BR      14$             ;RETURN HERE IF NO ERROR
    106 032730  000401                          BR      13$             ;GET AROUND ERROR
    107 032732  000000                  12$:    .WORD   0               ;ERROR # GOES HERE
    108 032734  005726                  13$:    TST     (SP)+           ;STRIP RETURN TO SUBROUTINE
    109 032736  062716  000006                  ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
    110 032742  113776  032732  000000          MOVB    12$,@(SP)       ;MOVE ERROR # TO USER CALL
    111 032750  000137  033412                  JMP     42$
    112
    113                             ;ISSUE A PACK ACKNOWLEDGE IF VOLUME VALID IS RESET
```

```
                                        14$:
 114 032754
 115 032754  032737  000100  001350            BIT     #VV,RMDSI       ;IS VV RESET ??
 116 032762  001052                            BNE     23$             ;NO !!
 117
 118 032764  012737  000023  001412            MOV     #PACACK!GO,RMCS1O       ;LOAD COMMAND
 119 032772  004737  036004                    JSR     PC,PUT          ;GO PUT COMMAND TO DRIVE
 120 032776  000411                            BR      17$             ;RETURN HERE IF NO OUTPUT ERROR
 121 033000  000401                            BR      16$             ;GET AROUND ERROR #
 122 033002  000000                    15$:    .WORD   0               ;ERROR # GOES HERE
 123 033004  062716  000006            16$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
 124 033010  113776  033002  000000            MOVB    15$,@(SP)       ;MOVE ERROR # TO ERROR CALL
 125 033016  000137  033412                    JMP     42$
 126
 127 033022  004737  036356            17$:    JSR     PC,TIMOUT       ;WAIT FOR COMPLETION
 128 033026  004737  035534                    JSR     PC,GET          ;GO GET STATUS FOR PACK ACK
 129 033032  000411                            BR      20$             ;RETURN HERE IF NO ERROR
 130 033034  000401                            BR      19$             ;GET AROUND ERROR #
 131 033036  000000                    18$:    .WORD   0               ;ERROR # GOES HERE
 132 033040  062716  000006            19$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
 133 033044  113776  033036  000000            MOVB    18$,@(SP)       ;MOVE ERROR # TO CALL
 134 033052  000137  033412                    JMP     42$
 135
 136 033056  004737  046452            20$:    JSR     PC,ACKSTS       ;GO VERIFY ACKNOWLEDGE STATUS
 137 033062  000412                            BR      23$             ;RETURN HERE IF NO ERROR
 138 033064  000401                            BR      22$             ;GET AROUND ERROR #
 139 033066  000000                    21$:    .WORD   0               ;ERROR # GOES HERE
 140 033070  005726                    22$:    TST     (SP)+           ;STRIP RETURN TO SUBROUTINE
 141 033072  062716  000006                    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
 142 033076  113776  033066  000000            MOVB    21$,@(SP)       ;MOVE ERROR # TO USERS ERROR CALL
 143 033104  000137  033412                    JMP     42$
 144
 145                                    ;RECALIBRATE THE DRIVE IF "SKI" OR 'PIP IS SET
 146 033110                             23$:
 147 033110  032737  040000  034512            BIT     #SKI,79$        ;WAS SKI SET ?
 148 033116  001004                            BNE     24$             ;YES, GO RECALIBRATE
 149 033120  032737  020000  001350            BIT     #PIP,RMDSI      ;IS PIP SET ??
 150 033126  001452                            BEQ     32$             ;NO !!
 151
 152 033130  012737  000007  001412    24$:    MOV     #RECAL!GO,RMCS1O        ;LOAD RECALIBRATE COMMAND
 153 033136  004737  036004                    JSR     PC,PUT          ;PUT THE RECAL COMMAND
 154 033142  000411                            BR      26$             ;RETURN HERE IF NO ERROR
 155 033144  000401                            BR      25$             ;GET AROUND ERROR #
 156 033146  000000                            .WORD   0               ;ERROR # GOES HERE
 157 033150  062716  000006            2.$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
 158 033154  113776  033146  000000            MOVB    25$-2,@(SP)     ;MOVE ERROR # TO USERS CALL
 159 033162  000137  033412                    JMP     42$
 160
 161 033166  004737  036356            26$:    JSR     PC,TIMOUT       ;WAIT FOR RECALIBRATE TO COMPLETE
 162 033172  004737  035534                    JSR     PC,GET          ;GO GET RECAL STATUS
 163 033176  000411                            BR      29$             ;RETURN HERE IF NO ERROR
 164 033200  000401                            BR      28$             ;GET AROUND ERROR #
 165 033202  000000                    27$:    .WORD   0               ;ERROR # GOES HERE
 166 033204  062716  000006            28$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
 167 033210  113776  033202  000000            MOVB    27$,@(SP)       ;MOVE ERROR TO USERS CALL
 168 033216  000137  033412                    JMP     42$
 169
 170 033222  004737  047246            29$:    JSR     PC,RCLSTS       ;GO VERIFY RECALIBRATE STATUS
```

```
                                        BR      32$             ;RETURN HERE IF NO ERROR
                                        BR      31$             ;GET AROUND ERROR #
                                30$:    .WORD   0               ;ERROR # GOES HERE
                                31$:    TST     (SP)+           ;STRIP RETURN TO SUBROUTINE
                                        ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
                                        MOVB    30$,@(SP)       ;MOVE ERROR # TO USERS CALL
                                        JMP     42$

                                ;READ THE SECTOR IDENTIFIED BY RMDA0, INCLUDING HEADER AND DATA
                                32$:
                                        MOV     #RH!GO,RMCS10   ;LOAD READ HEADER AND DATA COMMAND
                                        JSR     PC,PUT          ;PUT COMMAND
                                        BR      35$             ;RETURN HERE IF NO ERROR
                                        BR      34$             ;GET AROUND ERROR #
                                33$:    .WORD   0               ;ERROR # GOES HERE
                                34$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
                                        MOVB    33$,@(SP)       ;MOVE ERROR # TO USERS ERROR CALL
                                        JMP     42$

                                35$:    JSR     PC,TIMOUT       ;WAIT FOR READ OPERATION TO COMPLETE
                                        JSR     PC,GET          ;GO GET STATUS FOR READ OPERATION
                                        BR      38$             ;RETURN HERE IF NO ERROR
                                        BR      37$             ;GET AROUND ERROR #
                                36$:    .WORD   0               ;ERROR # GOES HERE
                                37$:    ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
                                        MOVB    36$,@(SP)       ;MOVE ERROR # TO CALL
                                        JMP     42$

                                38$:    JSR     PC,DTASTS       ;GO VERIFY RESULTS OF READ OPERATION
                                        BR      41$             ;RETURN HERE IF NO ERROR
                                        BR      40$             ;GET AROUND ERROR #
                                39$:    .WORD   0               ;ERROR # GOES HERE
                                40$:    TST     (SP)+           ;STRIP RETURN ADDRESS TO SUBROUTINE
                                        ADD     #6,(SP)         ;MOVE SP TO USERS ERROR CALL
                                        MOVB    39$,@(SP)       ;MOVE ERROR # TO USERS CALL
                                        JMP     42$

001336                          41$:    BIT     #TRE,RMCS1I     ;ANY CONTROLLER ERRORS ?
                                        BNE     42$             ;BR IF YES
                                        BR      51$             ;NO ERRORS DETECTED

                                ;;*****************************************************************
                                ;AN ERROR HAS BEEN DETECTED IN TRYING TO READ THE BAD SECTOR FILE.
                                ;THE SECTOR WILL BE RETRIED IF POSSIBLE.

                                42$:    DEC     74$             ;YES, DECREMENT RETRY COUNT AND
                                        BNE     48$             ;RETRY IF COUNT IS POSITIVE

                                ;THE RETRY COUNT HAS EXPIRED - SEE IF THE ERROR IS MEDIA RELATED

001352                                  BIT     #DCK!HCRC!HCE!FER!ECH,RMER1I    ;ANY MEDIA RELATED ERRORS ?
                                        BNE     43$             ;YES, GO TRY NEXT AVAILABLE SECTOR

001400                                  BIT     #BSE!SSE,RMER2I ;ANY MEDIA RELATED ERRORS ?
                                        BEQ     49$             ;NO, EXIT AND REPORT ERROR ON RETURN

                                ;THE ERRORS DETECTED WHILE TRYING TO RECOVER THE BAD SECTOR FILE ARE
```

```
                                        DUE TO THE MEDIA.  SEE IF THE BAD SECTOR FILE CAN BE RECOVERED FROM
                                        ;ANOTHER AREA ON THE LAST TRACK
033440  032737  000040  001400  43$:    BIT     #SSE,RMER2I     ;SSE ERROR ?
033446  001406                        BEQ     44$             ;NO !!
033450  005237  001420                INC     RMDAO           ;DISPLACE SECTOR ADDRESS BY 1 TO
                                                              ;ACCOUNT FOR THE SKIP SECTOR ERROR
033454  052737  001000  001444        BIS     #SSEI,RMOFO     ;AND SET SSEI IN OFFSET REGISTER.
033462  000432                        BR      47$             ;TRY AGAIN

033464  062737  000002  001420  44$:    ADD     #2,RMDAO        ;ADVANCE SECTOR ADDRESS BY 2
033472  022737  001056  001446        CMP     #558.,RMDCO     ;READING DEC 144 BAD SECTOR FILE ?
033500  001407                        BEQ     45$             ;YES !!
033502  005237  001420                INC     RMDAO           ;IF READING SSF, THEN ADVANCE SECTOR ADDRESS BY 1 MORE
033506  122737  000017  001420        CMPB    #15.,RMDAO      ;QUIT IF ALL SSF SECTORS HAVE BEEN
033514  101424                        BLOS    49$             ;TRIED.
033516  000414                        BR      47$

033520  022737  103726  001416  45$:    CMP     #MFGFIL,RMBAO   ;READING MANUFACTURES BAD FILE ?
033526  001004                        BNE     46$             ;NO !!
033530  122737  000012  001420        CMPB    #10.,RMDAO      ;QUIT IF ALL MFG SECTORS HAVE BEEN
033536  101413                        BLOS    49$             ;TRIED.
033540  122737  000040  001420  46$:    CMPB    #32.,RMDAO      ;QUIT IF ALL USER SECTORS HAVE BEEN
033546  101407                        BLOS    49$             ;TRIED.

033550  012737  000003  034500  47$:    MOV     #3,74$          ;REINSTATE RETRY COUNT FOR THIS SECTOR
033556  162716  000006          48$:    SUB     #6,(SP)         ;MOVE SP BACK TO NO ERROR
033562  000137  032566                JMP     3$              ;RETRY THE READ OPERATION

                                        ;THE BAD SECTOR FILE CANNOT BE READ
033566                          49$:
033566  000240                        NOP
033570  032777  020000  145356        BIT     #SW13,@SWR      ;INHIBIT MESSAGE ?
033576  001002                        BNE     50$             ;YES
033600  162716  000004                SUB     #4,(SP)         ;MOVE SP TO ERROR RETURN
033604  000137  034474          50$:    JMP     73$             ;GO TO MODULE EXIT

                                        ;THE SECTOR WAS RECOVERED WITHOUT ERROR - READ THE MFG/USER FILE IF
                                        ;THIS IS THE SSF FILE OR ELSE DONE.
033610                          51$:
033610  022737  001056  001446        CMP     #558.,RMDCO     ;READING DEC 144 FILES ?
033616  001422                        BEQ     52$             ;YES !!
033620  004737  034514                JSR     PC,GETSSF       ;GET SKIP SECTOR FILE FOR USE

033624  012737  001056  001446        MOV     #558.,RMDCO     ;READ DEC 144 FILE, CYLINDER 558.
033632  013737  001334  001420        MOV     LSTRK,RMDAO     ;MFG FILE LAST TRACK, SECTOR = 0
033640  012737  010000  001444        MOV     #FMT16,RMOFO    ;16 BIT FORMAT
033646  012737  103726  001416        MOV     #MFGFIL,RMBAO   ;POINT TO MANUFACTURES FILE BUFFER
033654  012737  177376  001414        MOV     #-258.,RMWCO    ;2 + 256. WORDS (2'S COMP)
033662  000415                        BR      53$             ;GO READ MFG FILE
033664                          52$:
033664  022737  104734  001416        CMP     #USRFIL,RMBAO   ;WAS THE USER FILE READ ??
033672  001416                        BEQ     54$             ;YES - READ IS COMPLETE
033674  112737  000012  001420        MOVB    #10.,RMDAO      ;READ THE USER FILE LAST TRACK, SECTOR = 10.
033702  012737  104734  001416        MOV     #USRFIL,RMBAO   ;POINT TO USERS FILE BUFFER
033710  012737  010000  001444        MOV     #FMT16,RMOFO    ;16 BIT FORMAT
```

```
033716  012737  000003  034500  53$:    MOV     #3,74$          ;RFLOAD THE RETRY COUNT FOR THIS SECTOR
033724  000137  032566                  JMP     3$              ;GO READ THE USER FILE

                                        ;SET MEDIA ENABLE AND RESTORE THE USERS PUT BUFFER
033730                                  54$:
033730  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
033732  005000                          CLR     R0              ;R0 IS REGISTER INDEX
033734  012737  177777  001512          MOV     #-1,MEDENB
033742  016060  101716  001412  55$:    MOV     BUFFER(R0),PUTBUF(R0)
033750  062700  000002                  ADD     #2,R0           ;ADVANCE R0
033754  022700  000046                  CMP     #46,R0          ;DONE ??
033760  103370                          BHIS    55$
033762  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0

                                        ;;*****************************************************************
                                        ;VERIFY THAT THE DESIRED SECTOR IS NOT IN THE MFG BAD SECTOR FILE,
                                        ;NOT IN THE USERS BAD SECTOR FILE AND NOT IN THE SSF BAD SECTOR FILE.
                                        ;ASSIGN A NEW SECTOR IF THE SECTOR IS IN ANY OF THE FILES.
                                        ;;*****************************************************************

                                        ;LOAD INITIAL VARIABLES AND COMPUTE THE NUMBER OF SECTORS
033764                                  56$:
033764  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
033766  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
033770  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
033772  013737  001446  001516          MOV     RMDC0,ASNDC     ;LOAD REQUESTED CYLINDER, TRACK,
034000  013737  001420  001520          MOV     RMDA0,ASNDA     ;AND SECTOR ADDRESS IN ASSIGNED STORAGE
034006  005002                          CLR     R2              ;R2 = NUMBER OF SECTORS
034010  013700  001414                  MOV     RMWC0,R0        ;R0 = WORD COUNT
034014  005400                          NEG     R0              ;MAKE NUMBER POSITIVE
034016  012701  000400                  MOV     #256.,R1        ;R1 = NUMBER OF WORDS PER SECTOR
034022  032737  000002  001412          BIT     #BIT1,RMCS10    ;IS THIS A HEADER AND DATA COMMAND ??
034030  001402                          BEQ     57$             ;NO !!
034032  012701  000402                  MOV     #258.,R1        ;CHANGE WORDS PER SECTOR
034036  020100          57$:    CMP     R1,R0           ;IS THERE A FULL SECTOR ??
034040  101404                  BLOS    58$             ;YES !!
034042  005700                  TST     R0              ;IS R0 ZERO ??
034044  001405                  BEQ     59$             ;YES !!
034046  005202                  INC     R2              ;INCREMENT FOR PARTIAL SECTOR
034050  000403                  BR      59$
034052  160100          58$:    SUB     R1,R0           ;SUBTRACT ONE SECTOR FROM WORD COUNT
034054  005202                  INC     R2              ;INCREMENT SECTOR COUNT
034056  000767                  BR      57$
034060  010237  034500  59$:    MOV     R2,74$          ;SAVE SECTOR COUNT

                                ;LOAD PARAMETERS AND SEARCH THE MFG, USER AND THE MAPPED SSF BAD
                                ;SECTOR FILES FOR THE ASSIGNED SECTOR. ALSO, SEARCH THE ADJACENT
                                ;SECTORS IF THE SECTOR COUNT IS MORE THAN ONE.

034064  012737  103742  034510          MOV     #MFGFIL+14,78$  ;THE STARTING ADDRESS OF MFG FILE
                                                                ;TO BASE ADDRESS STORAGE.
034072  004737  034132                  JSR     PC,60$          ;GO SEARCH FILE
034076  012737  104750  034510          MOV     #USRFIL+14,78$  ;LOAD STARTING ADDRESS OF USR FILE
                                                                ;TO BASE ADDRESS STORAGE.
034104  004737  034132                  JSR     PC,60$          ;GO SEARCH FILE
034110  012737  105746  034510          MOV     #SSFIL+4,78$    ;LOAD STARTING ADDRESS OF MAPPED SSF
                                                                ;FILE TO BASE ADDRESS STORAGE.
```

```
                                        CLR     SSFENB          ;ASSUME 'SSF' BIT IS NOT TO BE WRITTEN
                                                                ;IN THF 1ST HEADER WORD.
                                        JSR     PC,60$          ;SEARCH SKIP SECTOR MAPPED FILE
                                        JMP     71$             ;DONE WITH ALL FILE SEARCHES !!

                                60$:    MOV     ASNDC,76$       ;LOAD COMPARING CYLINDER ADDRESS
                                        MOV     ASNDA,77$       ;LOAD COMPARING TRACK, SECTOR ADDRESS
                                        MOV     74$,75$         ;LOAD NUMBER OF SECTORS TO CONFIRM

                                ;SETUP FOR A BINARY SEARCH OF THE CURRENT FILE FOR THE COMPARING
                                ;CYLINDER, TRACK AND SECTOR ADDRESS

                                61$:    MOV     78$,R0          ;LOAD THE BASE ADDRESS IN R0
                                62$:    CMP     #-1,(R0)        ;IS THIS FILE TERMINATOR ?
                                        BEQ     67$             ;BR IF YES
                                        CMP     76$,(R0)        ;IS THIS CYLINDER IN BAD TABLE ?
                                        BNE     63$             ;BR IF NO

                                ;FILE ENTRY EQUALS COMPARING CYLINDER.  SEE IF THE NEXT ENTRY EQUALS
                                ;THE COMPARING TRACK, AND SECTOR.

                                        CMPB    77$+1,3(R0)     ;IS THIS TRACK IN BAD TABLE ?
                                        BNE     63$             ;BR IF NO

                                        CMPB    77$,2(R0)       ;IS THIS SECTOR IN BAD TABLE ?
                                        BEQ     64$             ;BR IF YES
                                        BLT     63$             ;BR IF SECTOR IS LESS THAN TABLE ENTRY, ELSE
                                        MOV     #-1,SSFENB      ;ENABLE 'SSF' BIT TO BE WRITTEN IN THE
                                                                ;1ST HEADER WORD.

                                63$:    CMP     (R0)+,(R0)+     ;NO, ADJUST CYLINDER POINTER IN BAD FILE
                                        BR      62$             ;AND CONTINUE SEARCH.

                                ;THE COMPARING CYLINDER, TRACK AND SECTOR IS IN THE BAD SECTOR FILE.
                                ;ADVANCE THE ASSIGNED SECTOR AND START THE SEARCH ALL OVER.
                                64$:
                                        INCB    ASNDA           ;INCREMENT SECTOR
                                        BIT     #SSEI,RMOFO     ;IS SSEI SET ?
                                        BEQ     65$             ;NO !!
                                        CMPB    #31.,ASNDA      ;SECTOR OK ?
                                        BHIS    60$             ;YES !!
                                        BR      66$
                                65$:    CMPB    #30.,ASNDA      ;SECTOR OK ??
                                        BHIS    60$             ;YES !!
                                66$:    CLRB    ASNDA           ;CLEAR SECTOR AND ADVANCE TRACK
                                        INCB    ASNDA+1
                                        CMPB    LSTRK+1,ASNDA+1 ;TRACK OK ?
                                        BHIS    60$             ;YES !!
                                        CLR     ASNDA           ;CLEAR TRACK AND SECTOR
                                        INC     ASNDC           ;INCREMENT CYLINDER
                                        CMP     #560.,ASNDC     ;CYLINDER OK ??
                                        BHIS    60$             ;YES !!
                                        TST     (SP)+           ;RESTORE STACK AND
                                        BR      71$             ;GET OUT !!

                                ;THE COMPARING SECTOR IS NOT IN THE BAD SECTOR FILES.  DECREMENT THE
                                ;NUMBER OF SECTORS TO COMPARE AND SEARCH THE NEXT SECTOR IF THE NUMBER
```

```
                                        ;IS NOT ZERO.
                                67$:
034332  005337  034502                          DEC     75$             ;DECREMENT NUMBER OF SECTORS TO COMPARE
034336  001456                                  BEQ     73$             ;DONE IF ZERO

034340  105237  034506                          INCB    77$             ;INCREMENT THE COMPARING SECTOR
034344  032737  001000  001444                  BIT     #SSEI,RMOFO     ;IS SSEI SET ?
034352  001405                                  BEQ     68$             ;NO !!
034354  122737  000037  034506                  CMPB    #31.,77$        ;SECTOR OK ?
034362  103032                                  BHIS    70$             ;YES !!
034364  000404                                  BR      69$
034366  122737  000036  034506  68$:    CMPB    #30.,77$        ;SECTOR OK ??
034374  103025                                  BHIS    70$             ;YES !!
034376  105037  034506          69$:    CLRB    77$             ;CLEAR SECTOR
034402  105237  034507                          INCB    77$+1           ;INCREMENT TRACK
034406  123737  001335  034507                  CMPB    LSTRK+1,77$+1   ;TRACK OK ??
034414  103015                                  BHIS    70$             ;YES !!
034416  005037  034506                          CLR     77$             ;CLEAR SECTOR TRACK
034422  005237  034504                          INC     76$             ;INCREMENT CYLINDER
034426  022737  001060  034504                  CMP     #560.,76$       ;CYLINDER OK ??
034434  103005                                  BHIS    70$             ;YES !!
034436  013737  034504  001446                  MOV     76$,RMDCO       ;LOAD CYLINDER
034444  005726                                  TST     (SP)+           ;RESTORE STACK AND
034446  000407                                  BR      72$             ;GET OUT !!

034450  000641                  70$:    BR      61$             ;SEARCH NEXT SECTOR

                                        ;ASSIGN THE SECTOR AND RETURN TO USER
                                71$:
034452  013737  001516  001446                  MOV     ASNDC,RMDCO     ;LOAD CYLINDER
034460  013737  001520  001420                  MOV     ASNDA,RMDAO     ;LOAD TRACK AND SECTOR
034466                          72$:
034470  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
034472  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
034474  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0

034476  000240                  73$:    NOP
034500  000207                          RTS     PC

                                        ;THE FOLLOWING ARE STORAGE LOCATIONS FOR THE MODULE

034502  000000                  74$:    .WORD   0       ;RETRY COUNT/ NUMBER OF SECTORS REQUIRED
034504  000000                  75$:    .WORD   0       ;NUMBER OF SECTORS TO COMPARE
034506  000000                  76$:    .WORD   0       ;COMPARING CYLINDER
034510  000000                  77$:    .WORD   0       ;COMPARING TRACK AND SECTOR
034512  000000                  78$:    .WORD   0       ;BASE ADDRESS OF BAD SECTOR FILE BEING SEARCHED
                                79$:    .WORD   0       ;CONTAINS RMER2

                                        ;THIS ROUTINE SEARCHES THE SKIP SECTOR FILE FOR ANY BAD SECTORS
                                        ;WHICH OCCUR ON THE FE CYLINDERS. THE BAD SECTORS ARE THEN MAPPED
                                        ;INTO A 'SSFIL' TABLE TO BE USED BY THE 'BADSCT' ROUTINE.

034514                          GETSSF:
034514  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
034516  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
034520  012700  102722                  MOV     #BUFTWO,R0      ;R0 = POINTER TO BUFFER
034524  012701  105742                  MOV     #SSFIL,R1       ;R1 = POINTER TO SKIP SECTOR TABLE
```

```
    034530  012021                          MOV     (R0)+,(R1)+     ;SAVE HEADER WORD 0(CYL ADDRESS)
    034532  012021                          MOV     (R0)+,(R1)+     ;SAVE HEADER WORD 1(TRK/SEC ADDRESS)

    034534  012721  177777          1$:     MOV     #-1,(R1)+       ;INITIALIZE 'SSFIL' TABLE
    034540  022701  106036                  CMP     #SSFIL+60.,R1   ;DONE ?
    034544  001373                          BNE     1$              ;BR IF NO

    034546  012701  105746                  MOV     #SSFIL+4,R1     ;SETUP TO MAP SSFIL TABLE
    034552  062700  000026                  ADD     #22.,R0         ;GET OVER S/N(2), CREATE DATE, REV DATE, REV#,
                                                                    ;FORMAT TYPE, UNUSED WORDS(3), ENTRY# AND
                                                                    ;CHECKSUM (11. WORDS)
    034556  021027  001057          2$:     CMP     (R0),#559.      ;IS CYLINDER IN FE AREA ?
    034562  103410                          BLO     4$              ;NO !!
    034564  101004                          BHI     3$              ;YES, ON CYLINDER 560.
                                                                    ;YES, WHEN ON CYLINDER 559. DO NOT LOG
                                                                    ;ANY BAD SECTORS THAT OCCUR ON THE SKIP
                                                                    ;SECTOR TRACK(0) OR ALTERNATE DEC144 TRACK(1)
    034566  126027  000003  000001          CMPB    3(R0),#1        ;IS IT ON TRACK 0 OR 1 ?
    034574  003403                          BLE     4$              ;YES !!
    034576  011021                  3$:     MOV     (R0),(R1)+      ;LOG THIS CYLINDER AND
    034600  016021  000002                  MOV     2(R0),(R1)+     ;TRACK/SECTOR IN 'SSFIL' TABLE.

    034604  022020                  4$:     CMP     (R0)+,(R0)+     ;ADJUST BUFFER TO NEXT CYLINDER ENTRY
    034606  020127  106036                  CMP     R1,#SSFIL+60.   ;ANY MORE ENTRIES AVAILABLE IN TABLE ?
    034612  103003                          BHIS    5$              ;NO, EXIT !!
    034614  020027  105736                  CMP     R0,#BUFTWO+1548.        ;DONE WITH ALL 3 SECTORS ?
    034620  103756                          BLO     2$              ;NO, DO NEXT ENTRY

    034622  012737  177777  104732  5$:     MOV     #-1,MFGFIL+516. ;RESTORE TERMINATOR TO MFGFIL
    034630  000240                          NOP
    034632  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
    034634  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
    034636  000207                          RTS     PC
```

```
                                .SBTT'.  BUFFER GENERATOR SUBROUTINE

                                ;THIS SUBROUTINE GENERATES A DATA BUFFER FOR WRITE COMMANDS.  THE
                                ;BUFFER STARTS AT RMBA AND IS RMWC WORDS LONG.  THE BUFFER
                                ;CONTAINS A REPETITIVE DATA PATTERN CONSISTING OF $TMP1 WORDS
                                ;FROM THE DATA PATTERN TABLE, BEGINNING AT ADDRESS $TMP0.
                                ;HEADER INFORMATION FOR THE BUFFER IS EXTRACTED FROM RMDC,
                                ;RMDA AND RMOF.
                                ;
                                ;R0 = ADDRESS OF DATA BUFFER
                                ;R1 = LENGTH OF DATA BUFFER
                                ;R2 = ADDRESS OF DATA PATTERN
                                ;R3 = LENGTH OF DATA PATTERN
                                ;R4 = SECTOR COUNT

                                ;CALL:
                                ;(1)    JSR     PC,GENBUF
                                ;(2)    ??                      RETURN HERE

034640                          GENBUF:
034640  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
034642  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
034644  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
034646  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
034650  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
034652  013700  001416                  MOV     RMBA0,R0        ;LOAD DATA BUFFER ADDRESS
034656  013701  001414                  MOV     RMWC0,R1        ;LOAD WORD COUNT
034662  013737  001446  035102          MOV     RMDC0,7$        ;LOAD STARTING CYLINDER ADDRESS
034670  013737  001420  035104          MOV     RMDA0,8$        ;LOAD STARTING TRACK,SECTOR ADDRESS

034676  032737  000002  001412  1$:     BIT     #BIT1,RMCS10    ;WRITE HEADER & DATA??
034704  001451                          BEQ     3$              ;NO!!
034706  013710  035102                  MOV     7$,(R0) ;WRITE HEADER WORD #1
034712  052710  140000                  BIS     #MSE!USE,(R0)   ;SET BAD SECTOR FLAGS FOR GOOD SECTOR
034716  012702  000035                  MOV     #29.,R2         ;R2 = MAXIMUM SECTOR ADDRESS (29.)

034722  032737  010000  001444          BIT     #FMT16,RMOF0    ;18 BIT FORMAT??
034730  001410                          BEQ     2$              ;YES !!
034732  052710  010000                  BIS     #FMT16,(R0)     ;SET 16 FORMAT BIT IN HEADER
034736  005202                          INC     R2              ;CHANGE MAXIMUM SECTOR ADDRESS (30.)

034740  032737  001000  001444          BIT     #SSEI,RMOF0     ;IS SSEI SET TO ACCESS ALL SECTORS ?
034746  001401                          BEQ     2$              ;NO !!
034750  005202                          INC     R2              ;CHANGE MAXIMUM SECTOR ADDRESS (31.)

034752  005201                  2$:     INC     R1              ;INCREMENT WORD COUNT
034754  001443                          BEQ     6$              ;EXIT IF DONE

034756  005720                          TST     (R0)+           ;MOVE R0 TO HEADER WORD #2
034760  013720  035104                  MOV     8$,(R0)+        ;WRITE HEADER WORD #2
034764  005201                          INC     R1              ;INCREMENT WORD COUNT AND
034766  001436                          BEQ     6$              ;EXIT IF DONE
034770  012703  035104                  MOV     #8$,R3          ;ADVANCE SECTOR ADDRESS
034774  105213                          INCB    (R3)
034776  120213                          CMPB    R2,(R3)         ;SECTOR OVERFLOW ??
035000  103013                          BHIS    3$              ;NO !!
035002  105013                          CLRB    (R3)            ;YES - CLEAR SECTOR ADDRESS
```

BUFFER GENERATOR SUBROUTINE

```
     53 035004  105263  000001                 INCB    1(R3)             ;ADVANCE TRACK ADDRESS
     54 035010  123763  001335  000001         CMPB    LSTRK+1,1(R3)     ;TRACK OVERFLOW ??
     55 035016  103004                         BHIS    3$                ;NO !!
     56 035020  105063  000001                 CLRB    1(R3)             ;YES - CLEAR TRACK ADDRESS
     57 035024  105237  035102                 INCB    7$                ;ADVANCE CYLINDER ADDRESS
     58 035030  012704  000400           3$:   MOV     #256.,R4          ;LOAD SECTOR DATA COUNT
     59 035034  013702  001174           4$:   MOV     $TMP0,R2          ;LOAD PATTERN ADDRESS
     60 035040  013703  001176                 MOV     $TMP1,R3          ;LOAD PATTERN COUNT
     61 035044  012220                   5$:   MOV     (R2)+,(R0)+       ;WRITE DATA PATTERN
     62 035046  005201                         INC     R1                ;INCREMENT WORD COUNT AND
     63 035050  001405                         BEQ     6$                ;EXIT IF DONE
     64 035052  005304                         DEC     R4                ;DECREMENT SECTOR COUNT
     65 035054  001710                         BEQ     1$                ;START NEXT SECTOR IF 0
     66 035056  005303                         DEC     R3                ;DECREMENT PATTERN COUNT
     67 035060  001765                         BEQ     4$                ;RESTART PATTERN IF 0
     68 035062  000770                         BR      5$                ;CONTINUE DATA PATTERN
     69 035064                           6$:
        035064  012604                         MOV     (SP)+,R4          ;;POP STACK INTO R4
        035066  012603                         MOV     (SP)+,R3          ;;POP STACK INTO R3
        035070  012602                         MOV     (SP)+,R2          ;;POP STACK INTO R2
        035072  012601                         MOV     (SP)+,R1          ;;POP STACK INTO R1
        035074  012600                         MOV     (SP)+,R0          ;;POP STACK INTO R0
     70 035076  000240                         NOP
     71 035100  000207                         RTS     PC
     72
     73 035102  000000                   7$:   .WORD                     ;CYLINDER ADDRESS STORAGE
     74 035104  000000                   8$:   .WORD                     ;TRACK, SECTOR ADDRESS STORAGE
```

```
                                .SBTTL  COMPARE BUFFER SUBROUTINE

                                ;THIS SUBROUTINE COMPARES THE CONTENTS OF BUFONE AND BUFTWO,
                                ;ASSUMING THAT BUFONE IS THE BUFFER FROM WHICH DATA WAS WRITTEN
                                ;AND BUFTWO IS THE BUFFER TO WHICH DATA WAS READ. ERRORS IN BUFFER
                                ;COMPARISON ARE REPORTED TO THE USER VIA THE USER'S ERROR CALL.

                                ;CALL:
                                ;(1)    JSR     PC,CMPBUF
                                ;(2)    .WORD   WRITE BUFFER ADDRESS
                                ;       .WORD   READ BUFFER ADDRESS
                                ;(3)    BR      ??              RETURN HERE IF NO ERROR
                                ;(4)    NOP                     RETURN HERE IF ERROR
                                ;(5)    ERROR                   ERROR DEFINED BY SUBROUTINE
                                ;(6)    ???

035106                          CMPBUF:
035106  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
035110  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
035112  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
035114  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
035116  005037  035446                  CLR     14$             ;CLEAR CORRECTION FLAG

                                ;DETERMINE IF DATA SHOULD BE CORRECTED
035122  033737  004000  001370          BIT     ECI,RMOFI       ;WAS ECC CORRECTION ALLOWED ??
035130  001063                          BNE     9$              ;NO !!
035132  032737  100000  001352          BIT     #DCK,RMER1I     ;WAS THERE A DATA CHECK ??
035140  001457                          BEQ     9$              ;NO !!
035142  032737  000100  001352          BIT     #ECH,RMER1I     ;IS ERROR CORRECTION HARD SET ?
035150  001053                          BNE     9$              ;YES !!
035152  032737  010000  001370          BIT     #FMT16,RMOFI    ;IS THIS 16 BIT FORMAT ??
035160  001447                          BEQ     9$              ;NO !!

                                ;CORRECT DATA USING ECC INFORMATION
035162  013700  001416                  MOV     RMBA0,R0        ;R0 = STARTING BUFFER ADDRESS
035166  013701  001402                  MOV     RMEC1I,R1       ;R1 = ECC POSITION
035172  052737  100000  035446          BIS     #BIT15,14$      ;SET CORRECTION FLAG

                                ;MOVE R0 TO WORD BOUNDARY OF ERROR BURST
035200  022701  000020          1$:     CMP     #16.,R1         ;IS BIT POSITION > 1 WORD
035204  103004                          BHIS    2$              ;NO !!
035206  162701  000020                  SUB     #16.,R1         ;SUBTRACT 1 WORDS WORTH
035212  005720                          TST     (R0)+           ;ADVANCE BUFFER ADDRESS 1 WORD
035214  000771                          BR      1$
035216  012702  000001          2$:     MOV     #1,R2           ;R2 = BIT POINTER
035222  010203                          MOV     R2,R3           ;R3 = BIT NUMBER

                                ;MOVE R2 TO STARTING BIT OF ERROR BURST
035224  020301                  3$:     CMP     R3,R1           ;IS R3 SAME AS R1 ??
035226  001403                          BEQ     4$              ;YES !!
035230  006302                          ASL     R2              ;SHIFT BIT POINTER
035232  005203                          INC     R3              ;INCREMENT BIT NUMBER
035234  000773                          BR      3$
035236  012703  000013          4$:     MOV     #11.,R3         ;R3 = LENGTH OF ERROR BURST

                                ;CORRECT THE ERROR BURST
035242  030237  001404          5$:     BIT     R2,RMEC2I       ;IS THIS BIT SET IN ECC PATTERN ??
```

```
                                        BEQ     7$              ;NO - DO NOT CORRECT THIS BIT
                                        BIT     R2,(R0)         ;IS THE BIT PRESENTLY SET ??
                                        BEQ     6$              ;NO
                                        BIC     R2,(R0)         ;RESET THE BIT
                                        BR      7$
                                6$:     BIS     R2,(R0)         ;SET THE BIT
                                7$:     ASL     R2              ;SHIFT TO NEXT BIT
                                        BNE     8$
                                        MOV     #1,R2           ;CONTINUE WITH FIRST BIT OF NEXT WORD
                                        TST     (R0)+
                                8$:     DEC     R3              ;END OF BURST ??
                                        BNE     5$              ;NO !!

                                ;COMPARE WRITE BUFFER TO READ BUFFER
                                9$:     MOV     @10(SP),R0      ;R0 = WRITE BUFFER
                                        ADD     #2,10(SP)       ;MOVE SP TO READ ADDRESS
                                        MOV     @10(SP),R1      ;R1 = READ BUFFER
                                        ADD     #2,10(SP)       ;MOVE SP TO RETURN ADDRESS
                                        MOV     RMWCI,R2        ;R2 = NUMBER OF WORDS TRANSFER
                                        SUB     RMWCO,R2
                                10$:    CMP     (R0)+,(R1)+     ;COMPARE DATA WORDS
                                        BNE     11$             ;EXIT IF NOT EQUAL
                                        DEC     R2              ;DECREMENT WORD COUNT
                                        BNE     10$             ;CONTINUE IF NOT DONE
                                        BR      13$             ;DONE COMPARE - NO ERROR

                                ;DATA COMPARE FAILED
                                11$:    MOV     -(R0),$GDDAT    ;STORE GOOD DATA FOR TYPEOUT
                                        MOV     -(R1),$BDDAT    ;STORE BAD DATA FOR TYPEOUT
                                        MOV     R0,$GDADR       ;STORE ADDRESS OF GOOD DATA
                                        MOV     R1,$BDADR       ;STORE ADDRESS OF BAD DATA
                                        MOV     R2,$TMP0        ;STORE WORD COUNT OF ERROR
                                        ADD     #4,10(SP)       ;MOVE SP TO USER'S ERROR CALL
                                        MOVB    #336,@10(SP)    ;WRITE ERROR NUMBER IN CALL

                                ;CHANGE ERROR NUMBER IF ECC CORRECTION FAILED
                                        BIT     #BIT15,14$      ;WAS ECC CORRECTION USED ??
                                        BEQ     12$             ;NO !!
                                        MOVB    #163,@10(SP)    ;ECC CORRECTION FAILED
                                12$:    SUB     #2,10(SP)       ;MOVE SP TO RETURN IF ERROR
                                        NOP
                                13$:
                                        MOV     (SP)+,R3        ;;POP STACK INTO R3
                                        MOV     (SP)+,R2        ;;POP STACK INTO R2
                                        MOV     (SP)+,R1        ;;POP STACK INTO R1
                                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                                        RTS     PC              ;RETURN TO USER

                                14$:    .WORD                   ;ECC CORRECTION FLAG
```

GET STATUS SUBROUTINE

```
                                .SBTTL  GET STATUS SUBROUTINE

                                ;THIS SUBROUTINE SETS UP THE "GET INDEX TABLE" AND THE "GET
                                ;BUFFER" FOR READING ALL SUBSYSTEM REGISTERS VIA THE GET SUBROUTINE
                                ;AND THEN RETURNS TO THE USER.
                                ;
                                ;CALL:  JSR     PC,GETSTS
                                ;       ???                     RETURN HERE

035450                          GETSTS:
035450  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
035452  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
035454  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
035456  012700  001526                  MOV     #GETINX,R0      ;R0 = ADDRESS OF INDEX TABLE
035462  012701  001406                  MOV     #RMEC2I+2,R1    ;R1 = ADDRESS OF GET BUFFER
035466  012702  000046                  MOV     #RMEC2,R2       ;R2 = REGISTER INDE
035472  110220                  1$:     MOVB    R2,(R0)+        ;WRITE REGISTER INDEX IN TABLE
035474  005041                          CLR     -(R1)           ;CLEAR CORRESPONDING LOCATION
035476  162702  000002          2$:     SUB     #2,R2           ;DECREMENT TO NEXT INDEX
035502  100405                          BMI     3$              ;BRANCH OUT IF DONE
035504  022702  000022                  CMP     #RMDB,R2        ;DONT WRITE RMDB INDEX
035510  001370                          BNE     1$
035512  005041                          CLR     -(R1)
035514  000770                          BR      2$
035516  112720  000200          3$:     MOVB    #200,(R0)+      ;WRITE TERMINATOR
035522  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
035524  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
035526  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
035530  000240                          NOP
035532  000207                          RTS     PC
```

```
                                .SBTTL  GET SUBROUTINE
                                
                                ;THIS SUBROUTINE READS THE REGISTERS WHICH ARE LISTED IN THE
                                ;"GET INDEX TABLE" AND STORES THEIR VALUES IN THE CORRESPONDING
                                ;LOCATION IN THE "GET REGISTER BUFFER".  FOR EXAMPLE, AN
                                ;ENTRY OF 04 IN THE TABLE WILL CAUSE THE SUBROUTINE TO
                                ;READ "RMBA" AND STORE ITS CONTENTS AT THE LOCATION IN
                                ;THE BUFFER ASSIGNED TO THAT REGISTER.  THE NUMBER OF
                                ;REGISTERS TO BE READ IS VARIABLE FROM 1 TO 22; THE INDEX
                                ;TABLE MUST BE TERMINATED WITH A CONTROL BYTE (200)
                                ;WHICH SHOULD FOLLOW THE LAST ENTRY.
                                ;
                                ;SUBROUTINE CALL:
                                ;(1)     "GET INDEX TABLE" HAS BEEN LOADED WITH REGISTER INDEX
                                ;       VALUES AND TERMINATED WITH A CONTROL BYTE
                                ;(2)     "GET INPUT BUFFER" IS AVAILABLE FOR USE.  (NOTE THAT
                                ;       UNUSED LOCATIONS, I.E.,ENTRIES IN BUFFER CORRESPONDING
                                ;       TO REGISTERS NOT READ, ARE NOT CHANGED.)
                                ;(3)     JSR     PC,GET
                                ;       BR      ???             RETURN HERE IF NO ERROR FOUND
                                ;       NOP                     RETURN HERE IF ANY ERROR FOUND
                                ;       ERROR                   SUB DEFINES ERROR NUMBER
                                ;       ???
                                ;
                                ;R0 = REGISTER BASE ADDRESS
                                ;R1 = REGISTER ADDRESS
                                ;R2 = BUFFER BASE ADDRESS
                                ;R3 = BUFFER ADDRESS
                                ;R4 = POINTER TO REGISTER INDEX

035534  000240                  GET:    NOP
035536  062716  000004                  ADD     #4,(SP)         ;CLEAR ERROR NUMBER IN USER'S
035542  105076  000000                  CLRB    @(SP)           ;ERROR CALL
035546  162716  000004                  SUB     #4,(SP)
035552  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
035554  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
035556  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
035560  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
035562  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
035564  013746  000004                  MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
035570  013746  000006                  MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
035574  013700  001276                  MOV     $BASE,R0
035600  012702  001336                  MOV     #GETBUF,R2
035604  012704  001526                  MOV     #GETINX,R4
035610  012737  035716  000004          MOV     #3$,ERRVEC      ;SETUP FOR TIMEOUT
035616  012737  000300  000006          MOV     #PR6,ERRVEC+2
035624  016037  000010  001174  1$:     MOV     RMCS2(R0),$TMP0 ;GET "NED" STATUS
035632  016037  000000  001176          MOV     RMCS1(R0),$TMP1 ;GET "DVA" STATUS
035640  032737  004000  001176          BIT     #DVA,$TMP1      ;DEVICE AVAILABLE??
035646  001007                          BNE     2$              ;YES!!
035650  062766  000004  000016          ADD     #4,16(SP)       ;WRITE ERROR NUMBER IN USER'S
035656  112776  000112  000016          MOVB    #112,@16(SP)    ;ERROR CALL
035664  000423                          BR      4$
035666  105714                  2$:     TSTB    (R4)            ;DONE??
035670  100433                          BMI     6$              ;YES!!
035672  111401                          MOVB    (R4),R1         ;R1 = REGISTER ADDRESS
035674  042701  177700                  BIC     #^CIDXMSK,R1    ;CLEAR ANY SIGN EXTENSION
```

GET SUBROUTINE

```
     52 035700  060001                          ADD     R0,R1
     53 035702  112403                          MOVB    (R4)+,R3        ;R3 = STORAGE ADDRESS FOR REGISTER
     54 035704  042703  177700                  BIC     #^C1DXMSK,R3    ;CLEAR ANY SIGN EXTENSION
     55 035710  060203                          ADD     R2,R3
     56 035712  011113                          MOV     (R1),(R3)       ;READ REGISTER
     57 035714  000764                          BR      2$
     58
     59 035716  022626                  3$:     CMP     (SP)+,(SP)+     ;RESTORE STACK
     60 035720  062766  000004  000016          ADD     #4,16(SP)       ;WRITE ERROR NUMBER IN
     61 035726  112776  000007  000016          MOVB    #7,@16(SP)      ;USER'S ERROR CALL
     62 035734  162766  000002  000016  4$:     SUB     #2,16(SP)
     63 035742  105714                  5$:     TSTB    (R4)            ;DONE CLEARING??
     64 035744  100405                          BMI     6$              ;YES!!
     65 035746  005003                          CLR     R3              ;CLEAR REMAINING STORAGE
     66 035750  112403                          MOVB    (R4)+,R3        ;LOCATIONS
     67 035752  060203                          ADD     R2,R3
     68 035754  005013                          CLR     (R3)
     69 035756  000771                          BR      5$
     70 035760                          6$:
        035760  012637  000006                  MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
        035764  012637  000004                  MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
        035770  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
        035772  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
        035774  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
        035776  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
        036000  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
     71 036002  000207                          RTS     PC              ;RETURN
```

```
                                .SBTTL  PUT SUBROUTINE

                                ;THIS SUBROUTINE WRITES THE REGISTERS WHICH ARE LISTED IN THE
                                ;"PUT INDEX TABLE" WITH  THE CONTENTS OF THE CORRESPONDING
                                ;LOCATION IN THE "PUT PEGISTER BUFFER".  THE NUMBER OF
                                ;REGISTERS WRITTEN IS VARIABLE; THE INDEX TABLE MUST
                                ;BE TERMINATED WITH A CONTROL BYTE (200) WHICH SHOULD
                                ;FOLLOW THE LAST ENTRY.
                                ;
                                ;SUBROUTINE CALL:
                                ;
                                ;(1)     "PUT INDEX TABLE" HAS BEEN LOADED WITH INDEX VALUES
                                ;        OF REGISTERS TO BE WRITTEN.
                                ;(2)     "PUT REGISTER BUFFER" CONTAINS CONTENTS OF EACH
                                ;        REGISTER TO BE WRITTEN.
                                ;(3)     JSR     PC,PUT
                                ;        BR      ???             RETURN HERE IF NO ERROR FOUND
                                ;        NOP                     RETURN HERE IF ANY ERROR FOUND
                                ;        ERROR                   SUB DEFINES ERROR NUMBER
                                ;        ???
                                ;
                                ;R0 = REGISTER BASE ADDRESS
                                ;R1 = REGISTER ADDRESS
                                ;R2 = BUFFER BASE ADDRESS
                                ;R3 = BUFFER ADDRESS
                                ;R4 = POINTER TO REGISTER INDEX

036004  000240          PUT:    NOP
036006  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
036010  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
036012  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
036014  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
036016  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
036020  013746  000004          MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
036024  013746  000006          MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
036030  013700  001276          MOV     $BASE,R0
036034  012702  001412          MOV     #PUTBUF,R2
036040  012704  001555          MOV     #PUTINX,R4
036044  012737  036164  000004  MOV     #4$,ERRVEC      ;SETUP FOR TIMEOUT
036052  012737  000300  000006  MOV     #PR6,ERRVEC+2
036060  016037  000010  001174  1$:     MOV     RMCS2(R0),$TMP0 ;GET "NED" STATUS
036066  016037  000000  001176          MOV     RMCS1(R0),$TMP1 ;GET "DVA" STATUS
036074  032737  004000  001176          BIT     #DVA,$TMP1      ;DEVICE AVAILABLE??
036102  001007                  BNE     2$              ;YES!!
036104  062766  000004  000016  ADD     #4,16(SP)       ;WRITE ERROR NUMBER IN
036112  112776  000112  000016  MOVB    #112,@16(SP)    ;USER'S ERROR CALL
036120  000430                  BR      5$
036122  105714          2$:     TSTB    (R4)            ;DONE??
036124  100431                  BMI     6$              ;YES!!
036126  111401                  MOVB    (R4),R1         ;R1 = REGISTER ADDRESS
036130  042701  177700          BIC     #^CIDXMSK,R1    ;CLEAR ANY SIGN EXTENSION
036134  060001                  ADD     R0,R1
036136  111403                  MOVB    (R4),R3         ;R3 = STORAGE ADDRESS
036140  042703  177700          BIC     #^CIDXMSK,R3    ;CLEAR ANY SIGN EXTENSION
036144  060203                  ADD     R2,R3
036146  011311                  MOV     (R3),(R1)       ;WRITE REGISTER
036150  122714  000032          CMPB    #RMOF,(R4)      ;WAS RMOF JUST LOADED ?
```

PUT SUBROUTINE

```
     52 036154  001001                          BNE     3$                ;BR IF NO
     53 036156  011311                          MOV     (R3),(R1)         ;WRITE RMOF AGAIN, TO ENSURE THAT 16 BIT MODE
     54                                                                    ;IS SET BEFORE "SSEI" BIT IS SET.
     55 036160  105724                  3$:     TSTB    (R4)+             ;ADJUST REGISTER POINTER
     56 036162  000757                          BR      2$
     57
     58 036164  022626                  4$:     CMP     (SP)+,(SP)+       ;ADJUST STACK
     59 036166  062766  000004  000016           ADD     #4,16(SP)         ;WRITE ERROR NUMBER IN
     60 036174  112776  000007  000016           MOVB    #7,@16(SP)        ;USER'S ERROR CALL
     61 036202  162766  000002  000016  5$:      SUB     #2,16(SP)
     62
     63 036210                          6$:
        036210  012637  000006                    MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
        036214  012637  000004                    MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
        036220  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
        036222  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
        036224  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
        036226  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
        036230  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
     64 036232  000207                          RTS     PC              ;RETURN
```

```
                                .SBTTL  SIZE CLOCK SUBROUTINE

                        SIZCLK:
036234 013746 000004            MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
036240 013746 000006            MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
036244 012737 036302 000004     MOV     #1$,ERRVEC      ;SET UP FOR BUS TIMEOUT
036252 012737 000300 000006     MOV     #PR6,ERRVEC+2
036260 012737 177546 001522     MOV     #177546,CLKADR  ;LOAD ADDRESSES FOR KW11-L
036266 012737 000100 001524     MOV     #100,CLKVCT
036274 005777 143222            TST     @CLKADR         ;TEST FOR KW11-L PRESENT
036300 000421                   BR      3$              ;YES - KW11-L IS PRESENT
036302 022626           1$:     CMP     (SP)+,(SP)+     ;RESTORE SP
036304 012737 036334 000004     MOV     #2$,ERRVEC      ;SET UP FOR BUS TIMEOUT
036312 012737 172540 001522     MOV     #172540,CLKADR  ;LOAD ADDRESSES FOR KW11-P CLOCK
036320 012737 000104 001524     MOV     #104,CLKVCT
036326 005777 143170            TST     @CLKADR         ;TEST FOR KW11-P PRESENT
036332 000404                   BR      3$              ;YES - KW11-P IS PRESENT
036334 022626           2$:     CMP     (SP)+,(SP)+     ;RESTORE SP
036336 062766 000002 000004     ADD     #2,4(SP)        ;MOVE RETURN TO ERROR
036344                  3$:
036344 012637 000006            MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
036350 012637 000004            MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
036354 000207                   RTS     PC              ;RETURN TO USER
```

```
                                        .SBTTL  TIMEOUT SUBROUTINE
                                        ;
                                        ;THIS SUBROUTINE WAITS FOR RDY = 1 AND GO = 0 OR FOR A TIMEOUT
                                        ;GREATER THAN APPROX. 500 MSEC AND THEN RETURNS.
                                        ;
                                        ;CALL    JSR     PC,TIMOUT
                                        ;        ???                     RETURN HERE
                                        ;
036356                                  TIMOUT:
036356  010046                                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
036360  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
036362  013746  000004                          MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
036366  013746  000006                          MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
036372  012737  036456  000004                  MOV     #3$,ERRVEC      ;SETUP FOR BUS TIMEOUT - 04 TRAP
036400  012737  000300  000006                  MOV     #PR6,ERRVEC+2
036406  013700  001276                          MOV     $BASE,R0        ;R0=BASE ADDRES
036412  012702  000036                          MOV     #30.,R2         ;R2=NUMBER OF (      CYCLES
036416  004737  036520              1$:         JSR     PC,STIMER       ;START CLOCK TIMER
                                        ;
036422  016046  000000              2$:         MOV     RMCS1(R0),-(SP) ;GET STATUS
036426  042716  177576                          BIC     #^C<RDY!GO>,(SP)
036432  022726  000200                          CMP     #RDY,(SP)+      ;RDY=1,GO=0??
036436  001421                                  BEQ     4$              ;YES!!
036440  032777  000200  143054                  BIT     #BIT7,@CLKADR   ;TIMER DONE??
036446  001765                                  BEQ     2$              ;NO!!
036450  005302                                  DEC     R2              ;DEC NUMBER OF CYCLES
036452  001361                                  BNE     1$              ;CONTINUE IF NOT DONE
036454  000412                                  BR      4$              ;"RDY" DID NOT SET OR "GO" DID NOT RESET
                                                                        ;WITHIN 500 MSEC AFTER THE COMMAND WAS ISSUED.
036456  022626                          3$:     CMP     (SP)+,(SP)+     ;ADJUST STACK
036460  062766  000004  000012                  ADD     #4,12(SP)       ;MOVE SP TO USER'S CALL
036466  112776  000007  000012                  MOVB    #7,@12(SP)      ;WRITE ERROR NUMBER
036474  162766  000002  000012                  SUB     #2,12(SP)
                                        ;
036502                                  4$:
036502  012637  000006                          MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
036506  012637  000004                          MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
036512  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
036514  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0
036516  000207                                  RTS     PC              ;RETURN TO USER
                                        ;
                                        ;THIS ROUTINE IS USED START THE KW11-L OR THE KW11-P CLOCK. THE CLOCK
                                        ;IS STARTED TO RUN IN FLAG MODE. A CLOCK WILL BE 16.667MS FOR A 60 HZ CPU
                                        ;AND 20MS FOR A 50 HZ CPU.
                                        ;
036520                                  STIMER:
036520  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
036522  013701  001522                          MOV     CLKADR,R1       ;R1=CLOCK ADDRESS
036526  020127  172540                          CMP     R1,#172540      ;KW11-P CLOCK??
036532  001003                                  BNE     1$              ;NO!!
036534  012761  000001  000002                  MOV     #1,2(R1)        ;SET COUNTER
036542  012711  000005              1$:         MOV     #BIT2!BIT0,(R1) ;START COUNTER
036546  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
036550  000207                                  RTS     PC              ;RETURN
```

```
                                .SBTTL  PRIMARY ERROR CHECK SUBROUTINE

                                ;THE PURPOSE OF THIS SUBROUTINE IS TO VERIFY THAT STATUS IS VALID AND
                                ;THAT FURTHER ERROR AND STATUS CHECKING SHOULD BE PERFORMED.  THE
                                ;FOLLOWING CHECKS ARE MADE:
                                ;
                                ;       .CORRECT UNIT IS SELECTED, I.E., THE UNIT SELECT BITS OF RMCS2
                                ;(BITS 0-2) EQUAL THE UNIT BEING TESTED;
                                ;
                                ;       .SELECTED UNIT IS AVAILABLE, I.E., DVA (BIT 11 OF RMCS1) IS SET
                                ;AND NED (BIT 12 OF RMCS2) IS RESET;
                                ;
                                ;       .LAST COMMAND WAS COMPLETED, I.E., THE MASSBUS CONTROLLER IS
                                ;READY (BIT 7 OF RMCS1) AND THE GO BIT IS RESET (BIT 0 OF RMCS1) OR THE
                                ;DRIVE READY BIT (BIT 7 OF RMDS) IS SET.
                                ;       .NO PARITY ERROR OCCURRED WHEN READING REMOTE REGISTERS,
                                ;I.E., MCPE = 0.
                                ;       .NO PARITY ERROR OCCURRED WHEN WRITING REMOTE REGISTERS,
                                ;I.E., PAR = 0, OR, PAR = DPE = 1

                                ;
                                ;THE SUBROUTINE ASSUMES THAT:
                                ;
                                ;       .STATUS HAS BEEN STORED IN THE REGISTER INPUT BUFFER,
                                ;IN PARTICULAR, RMCS1, RMCS2 AND RMDS HAVE BEEN STORED IN THEIR
                                ;CORRESPONDING LOCATIONS OF THE "GET" BUFFER.
                                ;
                                ;       .($UNIT) CONTAINS THE DRIVE NUMBER
                                ;
                                ;THE SUBROUTINE IS CALLED AS FOLLOWS:
                                ;
                                ;(1)    JSR     PC,PRIERR
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS

036552                          PRIERR:

                                ;CLEAR USER'S ERROR CALL
036552  062716  000004                ADD     #4,(SP)         ;MOVE (SP) TO ERROR CALL
036556  105076  000000                CLRB    @(SP)           ;CLEAR ERROR NUMBER
036562  162716  000004                SUB     #4,(SP)         ;MOVE (SP) TO NO ERROR RETURN

                                ;REPORT AN ERROR IF THE WRONG UNIT IS SELECTED
036566  013737  001346  001142        MOV     RMCS2I,$BDDAT   ;CORRECT UNIT SELECTED??
036574  042737  177770  001142        BIC     #^CUNTMSK,$BDDAT
036602  013737  001234  001140        MOV     $UNIT,$GDDAT    ;GOOD DATA FOR TYPEOUT
036610  042737  177770  001140        BIC     #^CUNTMSK,$GDDAT
036616  123737  001140  001142        CMPB    $GDDAT,$BDDAT   ;COMPARE EXPECTED AND RECEIVED
                                                              ;DRIVE NUMBERS
036624  001415                        BEQ     1$              ;YES!!
036626  062716  000004                ADD     #4,(SP)
036632  112776  000001  000000        MOVB    #1,@(SP)        ;ERROR 1
036640  162716  000002                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
036644  004736                        JSR     PC,@(SP)+       ;REPORT WRONG UNIT SELECTED
```

```
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP
                                                JMP     10$             ;SKIP OTHER CHECKS
                                        1$:

                                        ;REPORT AN ERROR IF THE DEVICE IS NOT AVAILABLE OR IF
                                        ;THE DEVICE IS NONEXISTANT
                                                BIT     #DVA,RMCS1I     ;DEVICE AVAILABLE??
                                                BNE     3$              ;YES!!
                                                MOV     RMCS1I,$GDDAT   ;EXPECTED STATUS
                                                BIS     #DVA,$GDDAT
                                                MOV     RMCS1I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)
                                                MOVB    #2,@(SP)        ;ERROR #2
                                                BIT     #NED,RMCS2I     ;WAS NED SET??
                                                BEQ     2$              ;NO!!
                                                MOV     RMCS2I,$GDDAT   ;EXPECTED STATUS
                                                MOV     RMCS2I,$BDDAT   ;RECEIVED STATUS
                                                BIC     #NED,$GDDAT
                                                MOVB    #3,@(SP)        ;YES - CHANGE ERROR NUMBER
                                        2$:     SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT DEVICE NOT AVAILABLE
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP
                                                BR      10$             ;SKIP OTHER CHECKS
                                        3$:

                                        ;REPORT AN ERROR IF MASSBUS CONTROLLER IS NOT READY
                                                BIT     #RDY,RMCS1I     ;CONTROLLER READY??
                                                BNE     4$              ;YES!!
                                                MOV     RMCS1I,$GDDAT   ;EXPECTED STATUS
                                                BIS     #RDY,$GDDAT
                                                BIC     #SC!TRE!MCPE!GO,$GDDAT
                                                MOV     RMCS1I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)
                                                MOVB    #4,@(SP)        ;ERROR #4
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT CONTROLLER NOT READY
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP
                                                BR      10$             ;SKIP OTHER CHECKS
                                        4$:

                                        ;REPORT AN ERROR IF GO IS NOT ZERO AND DRY IS NOT ONE
                                                BIT     #GO,RMCS1I      ;GO RESET??
                                                BEQ     5$              ;YES!!
                                                BIT     #DRY,RMDSI      ;DRIVE READY??
                                                BNE     5$              ;YES!!
                                                MOV     RMCS1I,$GDDAT   ;EXPECTED STATUS
                                                BIC     #SC!TRE!MCPE!GO,$GDDAT
                                                MOV     RMCS1I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)
                                                MOVB    #5,@(SP)        ;ERROR #5
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT DRIVE NOT READY
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP
```

```
                                                BR      10$
                                        5$:
                                        ;REPORT AN ERROR IF THE RH CONTROLLER DETECTED BAD
                                        ;PARITY ON THE MASSBUS CONTROL BUS
037164  032737  020000  001336            BIT     #MCPE,RMCS1I    ;PARITY ERROR ??
037172  001425                            BEQ     6$              ;NO!!
037174  013737  001336  001140            MOV     RMCS1I,$GDDAT   ;EXPECTED STATUS
037202  042737  160001  001140            BIC     #SC!TRE!MCPE!GO,$GDDAT
037210  013737  001336  001142            MOV     RMCS1I,$BDDAT   ;RECEIVED STATUS
037216  062716  000004                    ADD     #4,(SP)         ;MOVE STACK TO USER'S ERROR
037222  112776  000013  000000            MOVB    #13,@(SP)       ;ERROR #13
037230  162716  000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
037234  004736                            JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
037236  162716  000010                    SUB     #10,(SP)        ;RESTORE STACK
037242  000240                            NOP
037244  000453                            BR      10$
037246                                  6$:

                                        ;REPORT AN ERROR IF THE RM80 DETECTED A CONTROL BUS PARITY ERROR
037246  032737  000010  001352            BIT     #PAR,RMER1I     ;WAS THERE A PARITY ERROR??
037254  001451                            BEQ     11$             ;NO!!
037256  032737  000010  001400            BIT     #DPE,RMER2I     ;WAS IT THE CONTROL BUS??
037264  001045                            BNE     11$             ;NOT SURE!!
037266  032737  000010  001426            BIT     #PAR,RMER1O     ;DID TEST SET PAR ??
037274  001413                            BEQ     9$              ;NO!!
037276  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
037300  012700  001555                    MOV     #PUTINX,R0      ;R0 POINTS TO INDEX TABLE
037304  122710  000014            7$:     CMPB    #RMER1,(R0)     ;SEARCH TABLE FOR RMER1
037310  001002                            BNE     8$
037312  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
037314  000431                            BR      11$             ;PAR WAS SET BY TEST
037316  105720                    8$:     TSTB    (R0)+           ;END OF TABLE??
037320  100371                            BPL     7$              ;NO!!
037322  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
037324  013737  001352  001140    9$:     MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
037332  042737  000010  001140            BIC     #PAR,$GDDAT
037340  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
037346  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
037352  112776  000050  000000            MOVB    #50,@(SP)       ;WRITE THE ERROR NUMBER
037360  162716  000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
037364  004736                            JSR     PC,@(SP)        ;REPORT THE ERROR
037366  162716  000010                    SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
037372  000240                            NOP
037374  062716  000010            10$:    ADD     #10,(SP)        ;RETURN TO ERROR
037400  000240                    11$:    NOP                     ;RETURN TO NO ERROR
037402  000207                            RTS     PC
```

```
                                .SBTTL  SECONDARY ERROR CHECK SUBROUTINE
                                ;
                                ;THE ERROR CHECK SUBROUTINE PROVIDES DETECTION OF SECONDARY ERRORS
                                ;SUCH AS UNEXPECTED ERRORS AND UNEXPECTED REGISTER CONTENTS. THESE
                                ;ERRORS ARE DEEMED SECONDARY IN THAT THEY ARE NOT NECESSARILY
                                ;ASSOCIATED WITH THE OPERATION BEING PERFORMED.
                                ;WHEN THE SUBROUTINE IDENTIFIES SUCH AN ERROR, IT MOVES THE ERROR
                                ;NUMBER TO THE ERROR CALL IN THE TEST ROUTINE AND THEN RETURNS
                                ;TO THE TEST ROUTINE WHICH MAKES THE ERROR CALL. AFTER THE TEST ROUTINE
                                ;MAKES THE ERROR CALL, IT RETURNS TO THE SUBROUTINE WHICH THEN LOOKS FOR
                                ;OTHER ERRORS. WHEN ALL ERRORS HAVE BEEN REPORTED, THE SUBROUTINE
                                ;RETURNS TO THE ADDRESS FOLLOWING THE SUBROUTINE CALL.
                                ;
                                ;CALL:  JSR     PC,SECERR
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS

                                ;NOTE:  THE SUBROUTINE ASSUMES THAT REGISTERS HAVE BEEN STORED AT THE
                                ;INPUT REGISTER BUFFER.

 037404                         SECERR:

                                ;STORE FUNCTION CODE AND CLEAR USER'S ERROR NUMBER
 037404  013737  001412  043544         MOV     RMCS10,81$      ;STORE FUNCTION CODE
 037412  042737  177701  043544         BIC     #^C<F0!F1!F2!F3!F4>,81$
 037420  062716  000004                 ADD     #4,(SP)         ;MOVE (SP) TO ERROR CALL
 037424  105076  000000                 CLRB    @(SP)           ;CLEAR ERROR NUMBER
 037430  162716  000004                 SUB     #4,(SP)         ;MOVE (SP) TO NO ERROR RETURN

                                ;REPORT ERROR IF DRIVE IS NOT READY, I.E., IF DRY = 0
 037434  032737  000200  00135          BIT     #DRY,RMDSI      ;DRIVE READY??
 037442  001024                         BNE     1$              ;YES!!
 037444  013737  001350  001142         MOV     RMDSI,$BDDAT    ;BAD DATA FOR TYPEOUT
 037452  042737  177577  001142         BIC     #^CDRY,$BDDAT
 037460  012737  000200  001140         MOV     #DRY,$GDDAT     ;GOOD DATA FOR TYPEOUT
 037466  062716  000004                 ADD     #4,(SP)
 037472  112776  000010  000000         MOVB    #10,@(SP)       ;ERROR NUMBER
 037500  162716  000002                 SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
 037504  004736                         JSR     PC,@(SP)+       ;REPORT NOT READY
 037506  162716  000010                 SUB     #10,(SP)                ;RESTORE (SP) TO ERROR N
 037512  000240                         NOP

                                ;REPORT ERROR IF GO BIT IS NOT RESET
 037514  032737  000001  001336 1$:     BIT     #GO,RMCS11      ;GO BIT RESET??
 037522  001423                         BEQ     2$              ;YES!!
 037524  013737  001336  001142         MOV     RMCS11,$BDDAT   ;BAD DATA FOR TYPEOUT
 037532  042737  177776  001142         BIC     #^CGO,$BDDAT
 037540  005037  001140                 CLR     $GDDAT          ;GOOD DATA FOR TYPEOUT
 037544  062716  000004                 ADD     #4,(SP)
 037550  112776  000011  000000         MOVB    #11,@(SP)       ;ERROR NUMBER
 037556  162716  000002                 SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
 037562  004736                         JSR     PC,@(SP)+       ;REPORT DEVICE NOT AVAILABLE
 037564  162716  000010                 SUB     #10,(SP)        ;RESTORE (SP)
 037570  000240                         NOP
```

```
                                        ;REPORT ERROR IF FUNCTION CODE READ FROM DEVICE IS NOT CORRECT
037572 013737 001336 001142  2$:        MOV     RMCS1I,$BDDAT   ;IS FUNCTION CODE CORRECT??
037600 042737 177701 001142             BIC     #^C76,$BDDAT
037606 013737 043544 001140             MOV     81$,$GDDAT      ;EXPECTED FUNCTION CODE
037614 023737 001142 001140             CMP     $BDDAT,$GDDAT
037622 001413                           BEQ     3$              ;YES!!
037624 062716 000004                    ADD     #4,(SP)
037630 112776 000012 000000             MOVB    #12,@(SP)       ;ERROR NUMBER
037636 162716 000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
037642 004736                           JSR     PC,@(SP)+       ;REPORT WRONG FUNCTION CODE
037644 162716 000010                    SUB     #10,(SP)        ;RESTORE (SP)
037650 000240                           NOP
037652                          3$:
                                        ;REPORT AN ERROR IF COMPOSITE ERROR IS SET AND NO OTHER
                                        ;ERRORS ARE SET, OR IF COMPOSITE ERROR IS NOT SET AND
                                        ;OTHER ERRORS ARE SET
037652 005037 001140                    CLR     $GDDAT          ;EXPECT "ERR" = 0
037656 005737 001352                    TST     RMER1I          ;IS RMER1 = 0??
037662 001003                           BNE     4$              ;NO!!
037664 005737 001400                    TST     RMER2I          ;IS RMER2 = 0??
037670 001403                           BEQ     5$              ;YES!!
037672 052737 040000 001140  4$:        BIS     #ERR,$GDDAT     ;"ERR" SOULD BE SET
037700 013737 001350 001142  5$:        MOV     RMDSI,$BDDAT
037706 042737 137777 001142             BIC     #^CERR,$BDDAT
037714 023737 001140 001142             CMP     $GDDAT,$BDDAT   ;IS "ERR" OK??
037722 001412                           BEQ     6$              ;YES!!
037724 062716 000004                    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
037730 112776 000047 000000             MOVB    #47,@(SP)       ;WRITE ERROR NUMBER
037736 162716 000002                    SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
037742 004736                           JSR     PC,@(SP)+       ;REPORT INVALID COMP ERROR
037744 162716 000010                    SUB     #10,(SP)

                                        ;REPORT AN ERROR IF "TRE" IS SET AND NONE OF THE BITS WHICH SET
                                        ;TRE IS SET, OR IF TRE IS NOT SET AND ONE OR MORE BITS WHICH
                                        ;SET TRE IS SET
037750 005037 001140  6$:               CLR     $GDDAT          ;EXPECT "TRE" = 0
037754 013746 001346                    MOV     RMCS2I,-(SP)    ;WAS DLT, WCE, UPE, NED, NEM
037760 042726 000377                    BIC     #377,(SP)+      ;PGE, MXF OR MDPE SET
037764 001010                           BNE     7$              ;YES!!
037766 032737 040000 001350             BIT     #ERR,RMDSI      ;WAS EXCEPTION RECEIVED??
037774 001407                           BEQ     8$              ;NO!!
037776 022737 000030 043544             CMP     #SEARCH,81$     ;WAS DATA TRANSFERRED??
040004 103003                           BHIS    8$              ;NO!!
040006 052737 040000 001140  7$:        BIS     #TRE,$GDDAT     ;"TRE" SHOULD BE SET
040014 013737 001336 001142  8$:        MOV     RMCS1I,$BDDAT   ;BAD DATA FOR TYPEOUT
040022 042737 137777 001142             BIC     #^CTRE,$BDDAT
040030 023737 001140 001142             CMP     $GDDAT,$BDDAT   ;IS "TRE" OK??
040036 001413                           BEQ     9$              ;YES!!
040040 062716 000004                    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
040044 112776 000014 000000             MOVB    #14,@(SP)       ;WRITE ERROR NUMBER
040052 162716 000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
040056 004736                           JSR     PC,@(SP)+       ;REPORT TRE ERROR
040060 162716 000010                    SUB     #10,(SP)        ;RESTORE (SP)
040064 000240                           NOP
040066                          9$:
```

```
                                        ;;*****************************************************************
                                        ;USING THE FUNCTION CODE TABLE, CHECK FOR THE FOLLOWING ERRORS:
                                        ;       .STATUS BITS NOT SET THAT SHOULD BE SET, E.G., ATA AND ILF
                                        ;       .STATUS BITS SET THAT SHOULD NOT BE SET, E.G., WCE AND ECH
                                        ;NOTE THAT SOME ERROR BITS ARE CONDITIONAL ON THE COMMAND AND OTHER
                                        ;STATUS CONDITIONS, E.G., WRITE LOCK ERROR SHOULD ONLY BE SET IF
                                        ;WRITE LOCK IS ON AND THE COMMAND IS A WRITE.

                                        ;GET AND STORE THE ENTRY FROM THE FUNCTION CODE TABLE
040066  010046                                MOV     R0,-(SP)        ;;PUSH R0 ON STACK
040070  013700  043544                      MOV     81$,R0          ;GET FUNCTION CODE
040074  016037  064704  043536              MOV     FNCDTB(R0),78$  ;STORE ENTRY
040102  012600                              MOV     (SP)+,R0        ;;POP STACK INTO R0

                                        ;REPORT AN ERROR IF AN UNEXPECTED ATTENTION OCCURRED OR IF
                                        ;ATA IS NOT SET AND SHOULD BE SET.
040104  013737  043536  001140              MOV     78$,$GDDAT      ;GET EXPECTED ATA STATUS
040112  032737  040000  001350              BIT     #ERR,RMDSI      ;IS COMPOSITE EPROR SET ??
040120  001403                              BEQ     10$             ;NO !!
040122  052737  100000  001140              BIS     #ATA,$GDDAT     ;EXPECT AN ATTENTION
040130  042737  077777  001140  10$:        BIC     #^CATA,$GDDAT   ;STRIP DONT CARES
040136  013737  001350  001142              MOV     RMDSI,$BDDAT    ;GET RECEIVED ATA
040144  042737  077777  001142              BIC     #^CATA,$BDDAT   ;STRIP DONT CARES
040152  023737  001140  001142              CMP     $GDDAT,$BDDAT   ;IS ATA OK ??
040160  001413                              BEQ     11$             ;YES !!
040162  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
040166  112776  000006  000000              MOVB    #6,@(SP)        ;LOAD ERROR # IN CALL
040174  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
040200  004736                              JSR     PC,@(SP)+       ;REPORT ERROR
040202  162716  000010                      SUB     #10,(SP)        ;RESTORE SP
040206  000240                              NOP
040210                          11$:

                                        ;REPORT ERROR IF ILF IS INCORRECT, I.E., IF ILF DOES NOT COMPARE
                                        ;WITH FUNCTION CODE TABLE
040210  013737  043536  001140              MOV     78$,$GDDAT      ;GET EXPECTED ILF
040216  042737  177776  001140              BIC     #^CILF,$GDDAT   ;CLEAR ALL OTHER BITS
040224  013737  001352  001142              MOV     RMER1I,$BDDAT   ;GET RECEIVED ILF
040232  042737  177776  001142              BIC     #^CILF,$BDDAT   ;CLEAR ALL OTHER BITS
040240  023737  001140  001142              CMP     $GDDAT,$BDDAT   ;IS ILF OK ??
040246  001412                              BEQ     12$             ;YES !!
040250  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
040254  112776  000254  000000              MOVB    #254,@(SP)      ;WRITE ERROR NUMBER IN CALL
040262  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
040266  004736                              JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
040270  162716  000010                      SUB     #10,(SP)        ;MOVE SP TO NO ERROR
040274  005037  001140          12$:        CLR     $GDDAT          ;CLEAR EXPECTED STATUS

                                        ;REPORT AN ERROR IF WCE IS SET AND SHOULD NOT BE SET
040300  013746  043536                      MOV     78$,-(SP)       ;GET WCE STATUS ENABLE
040304  052716  137777                      BIS     #^CWCE,(SP)     ;SET ALL OTHER BITS
040310  013737  001346  001142              MOV     RMCS2I,$BDDAT   ;RECEIVED STATUS
040316  042637  001142                      BIC     (SP)+,$BDDAT    ;CLEAR WCE IF ENABLED
040322  001412                              BEQ     13$             ;BRANCH IF WCE OK
040324  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
040330  112776  000026  000000              MOVB    #26,@(SP)       ;WRITE ERROR NUMBER
040336  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
```

SECONDARY ERROR CHECK SUBROUTINE

```
040342  004736                          JSR     PC,@(SP)+       ;REPORT ERROR
040344  162716  000010                  SUB     #10,(SP)        ;RESTORE ERROR
040350                          13$:
                                ;REPORT ERROR IF OPI STATUS IS SET AND SHOULD NOT BE SET
040350  013746  043536                  MOV     78$,-(SP)       ;GET OPI STATUS ENABLE
040354  052716  157777                  BIS     #^COPI,(SP)     ;SET ALL OTHER BITS
040360  013737  001352  001142          MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
040366  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR OPI IF ENABLED
040372  001412                          BEQ     14$             ;BRANCH IF OPI OK
040374  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
040400  112776  000164  000000          MOVB    #164,@(SP)      ;WRITE ERROR NUMBER IN CALL
040406  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
040412  004736                          JSR     PC,@(SP)+       ;REPORT ERROR
040414  162716  000010                  SUB     #10,(SP)        ;RESTORE SP
040420                          14$:
                                ;REPORT ERROR IF IVC IS SET AND IS NOT ENABLED OR IF IVC IS
                                ;SET AND VV IS NOT RESET
040420  013746  043536                  MOV     78$,-(SP)       ;GET IVC STATUS ENABLE
040424  032737  000100  001350          BIT     #VV,RMDSI       ;IS VV SET
040432  001402                          BEQ     15$             ;NO !!
040434  042716  010000                  BIC     #IVC,(SP)       ;YES - IVC SHOULD BE 0
040440  052716  167777          15$:    BIS     #^CIVC,(SP)     ;SET ALL OTHER BITS
040444  013737  001400  001142          MOV     RMER2I,$BDDAT   ;GET RECEIVED STATUS
040452  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR IVC IF ENABLED
040456  001412                          BEQ     16$             ;BRANCH IF IVC OK
040460  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
040464  112776  000165  000000          MOVB    #165,@(SP)      ;WRITE ERROR NUMBER IN CALL
040472  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
040476  004736                          JSR     PC,@(SP)+       ;REPORT ERROR
040500  162716  000010                  SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
040504                          16$:
                                ;BIT 11 (WLE) OF THE FUNCTION CODE TABLE IS THE ENABLING BIT FOR
                                ; ALL WRITE ERRORS, I.E.,
                                ;       RMER1 - WLE, WCF
                                ;       RMER2 - DPE
                                ;       RMCS2 - UPE.
                                ;EACH OF THESE ERRORS IS CHECKED TO SEE IF AN ERROR IS SET WHEN THE
                                ;WRITE ERROR ENABLE BIT IS RESET.

                                ;REPORT AN ERROR IF WLE IS SET AND WRITE ERRORS ARE NOT ENABLED, OR IF
                                ;THE DRIVE IS NOT WRITE PROTECTED
040504  012746  177777                  MOV     #-1,-(SP)       ;ASSUME WRITE ERRORS ENABLED
040510  032737  004000  043536          BIT     #WLE,78$        ;ARE WRITE ERRORS ENABLED ??
040516  001404                          BEQ     17$             ;NO !!
040520  032737  004000  001350          BIT     #WRL,RMDSI      ;IS THE DRIVE WRITE PROTECTED ??
040526  001002                          BNE     18$             ;YES !!
040530  042716  004000          17$:    BIC     #WLE,(SP)       ;RESET WLE ENABLE
040534  013737  001352  001142  18$:    MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
040542  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR WLE IF ENABLED
040546  001412                          BEQ     19$             ;BRANCH IF WLE OK
040550  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
040554  112776  000023  000000          MOVB    #23,@(SP)       ;WRITE ERROR NUMBER IN CALL
040562  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
040566  004736                          JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
```

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                                                SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        19$:
                                        ;REPORT ERROR IF WCF IS SET AND WRITE ERRORS ARE NOT ENABLED
                                                MOV     #-1,-(SP)       ;ASSUME WRITE ERRORS ENABLED
                                                BIT     #WLE,78$        ;ARE WRITE ERRORS ENABLED ??
                                                BNE     20$             ;YES !!
                                                BIC     #WCF,(SP)       ;DISABLE WCF ERROR
                                        20$:    MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     (SP)+,$BDDAT    ;RESET WCF IF ENABLED
                                                BEQ     21$             ;BRANCH IF WCF OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #25,@(SP)       ;WRITE ERROR NUMBER IN CALL
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                                JSR     PC,@(SP)+       ;REPORT ERROR
                                                SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        21$:
                                        ;REPORT ERROR IF DPE IS SET AND WRITE ERRORS ARE NOT ENABLED
                                                MOV     #-1,-(SP)       ;ASSUME WRITE ERRORS ARE ENABLED
                                                BIT     #WLE,78$        ;ARE WRITE ERRORS ENABLED ??
                                                BNE     22$             ;YES !!
                                                BIC     #DPE,(SP)       ;RESET DPE ENABLE
                                        22$:    MOV     RMER2I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     (SP)+,$BDDAT    ;RESET DPE IF ENABLED
                                                BEQ     23$             ;BRANCH IF DPE OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #40,@(SP)       ;WRITE ERROR NUMBER IN CALL
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                                JSR     PC,@(SP)+       ;REPORT ERROR
                                                SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        23$:
                                        ;REPORT AN ERROR IF UPE IS SET AND WRITE ERRORS ARE NOT ENABLED
                                                MOV     #-1,-(SP)       ;ASSUME WRITE ERRORS ARE ENABLED
                                                BIT     #WLE,78$        ;ARE WRITE ERRORS ENABLED ??
                                                BNE     24$             ;YES !!
                                                BIC     #UPE,(SP)       ;DISABLE UPE ERROR
                                        24$:    MOV     RMCS2I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     (SP)+,$BDDAT    ;RESET UPE IF ENABLED
                                                BEQ     25$             ;BRANCH IF UPE OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #24,@(SP)       ;WRITE ERROR NUMBER IN CALL
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        25$:
                                        ;REPORT AN ERROR IF IAE IS SET AND IS NOT ENABLED
                                                MOV     78$,-(SP)       ;GET IAE ENABLE
                                                BIS     #^CIAE,(SP)     ;SET ALL OTHER BITS
                                                MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     (SP)+, $BDDAT   ;CLEAR IAE IF ENABLED
                                                BEQ     26$             ;BRANCH IF IAE IS OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #166,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
```

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                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        26$:

                                        ;BIT 09 (AOE) OF THE FUNCTION CODE TABLE IS THE ENABLING BIT FOR
                                        ; ALL READ/WRITE ERRORS, I.E.,
                                        ;       RMCS1 - TRE
                                        ;       RMCS2 - DLT,NEM,MXF
                                        ;       RMDS  - LBT
                                        ;       RMER1 - AOE
                                        ;NOTE:
                                        ;       LBT IS NOT CHECKED BECAUSE IT ONLY RESETS WHEN THE DESIRED
                                        ;       CYLINDER REGISTER IS WRITTEN
                                        ;NOTE:
                                        ;       AOE CANNOT BE SET IF LBT IS NOT ALSO SET
                                        ;NOTE:
                                        ;       TRE IS CHECKED AS A FUNCTION OF OTHER ERROR CONDITONS ABOVE


                                        ;REPORT AN ERROR IF DLT IS SET AND READ/WRITE ERRORS ARE NOT ENABLED
041064  012746  177777                          MOV     #-1,-(SP)       ;ASSUME ERRORS ARE ENABLED
041070  032737  001000  043536                  BIT     #AOE,78$        ;ARE ERRORS ENABLED ??
041076  001002                                  BNE     27$             ;YES !!
041100  042716  100000                          BIC     #DLT,(SP)       ;RESET DLT ENABLE
041104  013737  001346  001142          27$:    MOV     RMCS2I,$BDDAT   ;GET RECEIVED STATUS
041112  042637  001142                          BIC     (SP)+,$BDDAT    ;CLEAR DLT IF ENABLED
041116  001412                                  BEQ     28$             ;BRANCH IF DLT IS OK
041120  062716  000004                          ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
041124  112776  000032  000000                  MOVB    #32,@(SP)       ;WRITE ERROR NUMBER IN CALL
041132  162716  000002                          SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
041136  004736                                  JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
041140  162716  000010                          SUB     #10,(SP)        ;MOVE SP TO NO ERROR
041144                                  28$:

                                        ;REPORT ERROR IF NEM IS SET AND READ/WRITE ERRORS ARE NOT ENABLED
041144  012746  177777                          MOV     #-1,-(SP)       ;ASSUME ERRORS ARE ENABLED
041150  032737  001000  043536                  BIT     #AOE,78$        ;ARE ERRORS ENABLED ??
041156  001002                                  BNE     29$             ;YES !!
041160  042716  004000                          BIC     #NEM,(SP)       ;DISABLE NEM
041164  013737  001346  001142          29$:    MOV     RMCS2I,$BDDAT   ;GET RECEIVED STATUS
041172  042637  001142                          BIC     (SP)+,$BDDAT    ;CLEAR NEM IF ENABLED
041176  001412                                  BEQ     30$             ;BRANCH IF NEM IS OK
041200  062716  000004                          ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
041204  112776  000167  000000                  MOVB    #167,@(SP)      ;WRITE ERROR NUMBER IN CALL
041212  162716  000002                          SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
041216  004736                                  JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
041220  162716  000010                          SUB     #10,(SP)        ;MOVE SP TO NO ERROR
041224                                  30$:

                                        ;REPORT ERROR IF MXF IS SET AND READ/WRITE ERRORS ARE NOT ENABLED
041224  012746  177777                          MOV     #-1,-(SP)       ;ASSUME ERRORS ARE ENABLED
041230  032737  001000  043536                  BIT     #AOE,78$        ;ARE DATA ERRORS ENABLED ??
041236  001002                                  BNE     31$             ;YES !!
041240  042716  001000                          BIC     #MXF,(SP)       ;DISABLE MXF ERROR
041244  013737  001346  001142          31$:    MOV     RMCS2I,$BDDAT   ;GET RECEIVED STATUS
041252  042637  001142                          BIC     (SP)+,$BDDAT    ;CLEAR MXF IF ENABLED
041256  001412                                  BEQ     32$             ;BRANCH IF MXF IS OK
```

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041260  062716  000004            ADD     #4,(SP)          ;MOVE SP TO USERS ERROR CALL
041264  112776  000033  000000    MOVB    #33,@(SP)        ;WRITE ERROR NUMBER IN CALL
041272  162716  000002            SUB     #2,(SP)          ;MOVE SP TO ERROR RETURN
041276  004736                    JSR     PC,@(SP)+        ;REPORT ERROR AND RETURN
041300  162716  000010            SUB     #10,(SP)         ;MOVE SP TO NO ERROR
041304                    32$:

                          ;REPORT ERROR IF AOE IS SET AND DATA ERRORS ARE NOT ENABLED
041304  012746  177777            MOV     #-1,-(SP)        ;ASSUME DATA ERRORS ARE ENABLED
041310  032737  001000  043536    BIT     #AOE,78$         ;ARE DATA ERRORS ENABLED ??
041316  001404                    BEQ     33$              ;NO !!
041320  032737  002000  001350    BIT     #LBT,RMDSI       ;IS LBT ALSO SET ??
041326  001002                    BNE     34$              ;YES !!
041330  042716  001000    33$:    BIC     #AOE,(SP)        ;DISABLE AOE
041334  013737  001352  001142    34$:    MOV     RMER1I,$BDDAT    ;GET RECEIVED STATUS
041342  042637  001142            BIC     (SP)+,$BDDAT     ;CLEAR AOE IF ENABLED
041346  001412                    BEQ     35$              ;BRANCH IF AOE IS OK
041350  062716  000004            ADD     #4,(SP)          ;MOVE SP TO USERS ERROR CALL
041354  112776  000020  000000    MOVB    #20,@(SP)        ;WRITE ERROR NUMBER
041362  162716  000002            SUB     #2,(SP)          ;MOVE SP TO ERROR RETURN
041366  004736                    JSR     PC,@(SP)+        ;REPORT ERROR AND RETURN
041370  162716  000010            SUB     #10,(SP)         ;MOVE SP TO NO ERROR
041374                    35$:

                          ;BIT 07 (HCE) OF THE FUNCTION CODE TABLE IS THE ENABLING BIT FOR
                          ;HEADER ERRORS, I.E.,
                          ;       RMER1 - HCRC,HCE,FER
                          ;       RMER2 - BSE,SSE

                          ;RESET THE ENABLING BIT (HCE) IF HEADER COMPARE INHIBIT IS SET
041374  032737  002000  001370    BIT     #HCI,RMOFI       ;IS HCI SET ??
041402  001403                    BEQ     36$              ;NO !!
041404  042737  000200  043536    BIC     #HCE,78$         ;YES - DISABLE ALL HEADER ERRORS
041412                    36$:

                          ;REPORT AN ERROR IF HCRC IS SET AND HEADER ERRORS ARE NOT ENABLED
041412  012746  177777            MOV     #-1,-(SP)        ;ASSUME ERRORS ENABLED
041416  032737  000200  043536    BIT     #HCE,78$         ;ARE HEADER ERRORS ENABLED ??
041424  001002                    BNE     37$              ;YES !!
041426  042716  000400            BIC     #HCRC,(SP)       ;DISABLE HCRC
041432  013737  001352  001142    37$:    MOV     RMER1I,$BDDAT    ;GET RECEIVED STATUS
041440  042637  001142            BIC     (SP)+,$BDDAT     ;RESET HCRC IF ENABLED
041444  001412                    BEQ     38$              ;BRANCH IF HCRC IS OK
041446  062716  000004            ADD     #4,(SP)          ;MOVE SP TO USERS ERROR CALL
041452  112776  000035  000000    MOVB    #35,@(SP)        ;WRITE ERROR NUMBER IN CALL
041460  162716  000002            SUB     #2,(SP)          ;MOVE SP TO ERROR RETURN
041464  004736                    JSR     PC,@(SP)+        ;REPORT ERROR AND RETURN
041466  162716  000010            SUB     #10,(SP)         ;MOVE SP TO NO ERROR
041472                    38$:

                          ;REPORT ERROR IF HCE IS SET AND HEADER ERRORS ARE NOT ENABLED
041472  012746  177777            MOV     #-1,-(SP)        ;ASSUME ERRORS ENABLED
041476  032737  000200  043536    BIT     #HCE,78$         ;ARE ERRORS ENABLED ??
041504  001002                    BNE     39$              ;YES !!
041506  042716  000200            BIC     #HCE,(SP)        ;DISABLE HCE
041512  013737  001352  001142    39$:    MOV     RMER1I,$BDDAT    ;GET RECEIVED STATUS
041520  042637  001142            BIC     (SP)+,$BDDAT     ;CLEAR HCE IF ENABLED
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                                                BEQ     40$             ;BRANCH IF HCE IS OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #36,@(SP)       ;WRITE ERROR NUMBER IN CALL
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        40$:

                                        ;REPORT ERROR IF FER IS SET AND HEADER ERRORS ARE NOT ENABLED
                                                MOV     #-1,-(SP)       ;ASSUME FER IS ENABLED
                                                BIT     #HCE,78$        ;ARE HEADER ERRORS ENABLED ??
                                                BNE     41$             ;YES !!
                                                BIC     #FER,(SP)       ;DISABLE FER
                                        41$:    MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     (SP)+,$BDDAT    ;RESET FER IF ENABLED
                                                BEQ     42$             ;BRANCH IF FER OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #37,@(SP)       ;WRITE ERROR NUMBER IN CALL
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        42$:

                                        ;REPORT ERROR IF BSE IS SET AND HEADER ERRORS ARE NOT ENABLED
                                                MOV     #-1,-(SP)       ;ASSUME ERRORS ENABLED
                                                BIT     #HCE,78$        ;ARE THEY ENABLED ??
                                                BNE     43$             ;YES !!
                                                BIC     #BSE,(SP)       ;DISABLE BSE
                                        43$:    MOV     RMER2I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     (SP)+,$BDDAT    ;CLEAR BSE IF ENABLED
                                                BEQ     44$             ;BRANCH IF BSE OK
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #354,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        44$:

                                        ;HCE IS USED AS THE ENABLING BIT FOR DETECTING SSE, SO REESTABLISH ENTRY
                                        ;FROM THE FUNCTION CODE TABLE, TO CHECK THE "SSE" BIT
                                                MOV     R0,-(SP)        ;;PUSH R0 ON STACK
                                                MOV     81$,R0          ;GET FUNCTION CODE
                                                MOV     FNCDTB(R0),78$  ;STORE FUNCTION TABLE ENTRY
                                                MOV     (SP)+,R0        ;;POP STACK INTO R0

                                        ;IF SKIP SECTOR ERROR INHIBIT (SSEI) IS SET OR FORMAT 16 (FMT) IS CLEAR,
                                        ;RESET THE ENABLING BIT (HCE), OTHERWISE LEAVE ENABLING BIT (HCE) SET.
                                                BIT     #FMT16,RMOFI    ;18 BIT FORMAT MODE ?
                                                BEQ     45$             ;BR IF YES
                                                BIT     #SSEI,RMOFI     ;IS SSEI SET ?
                                                BEQ     46$             ;BR IF NO
                                        45$:    BIC     #HCE,78$        ;DISABLE HEADER ERROR
                                        46$:

                                        ;REPORT ERROR IF SSE IS SET AND HEADER ERROR IS NOT ENABLED
                                                MOV     #-1,-(SP)       ;ASSUME ERRORS ENABLED
                                                BIT     #HCE,78$        ;IS HCE ENABLED ?
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    457 041770  001002                          BNE     47$             ;YES !!
    458 041772  042716  000040                  BIC     #SSE,(SP)       ;DISABLE SSE
    459 041776  013737  001400  001142  47$:    MOV     RMER2I,$BDDAT   ;GET RECIEVED STATUS
    460 042004  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR SSE IF NOT VALID FOR FUNCTION
    461 042010  001412                          BEQ     48$             ;BRANCH IF SSE OK
    462 042012  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
    463 042016  112776  000063  000000          MOVB    #63,@(SP)       ;WRITE ERROR NUMBER
    464 042024  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
    465 042030  004736                          JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
    466 042032  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR
    467 042036                          48$:
    468
    469                                 ;BIT 06 OF THE FUNCTION CODE TABLE IS THE ENABLING BIT FOR DATA
    470                                 ;FIELD ERRORS, I.E.,
    471                                 ;       RMCS2 - MDPE
    472                                 ;       RMER1 - DCK,ECH
    473                                 ;NOTE:
    474                                 ;       ECH CANNOT SET UNLESS IT IS ENABLED AND ECI IS RESET AND
    475                                 ;       DCK IS SET.
    476
    477                                 ;REPORT ERROR IF MDPE IS SET AND IS NOT ENABLED
    478 042036  012746  177777                  MOV     #-1,-(SP)       ;ASSUME ENABLED
    479 042042  032737  000100  043536          BIT     #ECH,78$        ;ARE DATA FIELD ERRORS ENABLED ??
    480 042050  001002                          BNE     49$             ;YES !!
    481 042052  042716  000400                  BIC     #MDPE,(SP)      ;DISBALE MDPE
    482 042056  013737  001346  001142  49$:    MOV     RMCS2I,$BDDAT   ;GET RECEIVED STATUS
    483 042064  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR MDPE IF ENABLED
    484 042070  001412                          BEQ     50$             ;BRANCH IF MDPE OK
    485 042072  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
    486 042076  112776  000027  000000          MOVB    #27,@(SP)       ;WRITE ERROR NUMBER IN CALL
    487 042104  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
    488 042110  004736                          JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
    489 042112  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR
    490 042116                          50$:
    491
    492                                 ;REPORT ERROR IF DCK IS SET AND DATA FIELD ERRORS ARE NOT ENABLED
    493 042116  012746  177777                  MOV     #-1,-(SP)       ;ASSUME ENABLED
    494 042122  032737  000100  043536          BIT     #ECH,78$        ;ARE THEY ENABLED ??
    495 042130  001002                          BNE     51$             ;YES !!
    496 042132  042716  100000                  BIC     #DCK,(SP)       ;DISABLE DCK
    497 042136  013737  001352  001142  51$:    MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
    498 042144  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR DCK IF ENABLED
    499 042150  001412                          BEQ     52$             ;BRANCH IF DCK IS OK
    500 042152  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
    501 042156  112776  000030  000000          MOVB    #30,@(SP)       ;WRITE ERROR NUMBER IN CALL
    502 042164  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
    503 042170  004736                          JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
    504 042172  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR
    505 042176                          52$:
    506
    507                                 ;REPORT ERROR IF ECH IS SET AND,
    508                                 ;       DATA FIELD ERRORS ARE NOT ENABLED, OR
    509                                 ;       ECI IS SET, OR
    510                                 ;       DCK IS NOT SET.
    511 042176  012746  177777                  MOV     #-1,-(SP)       ;ASSUME ENABLED
    512 042202  032737  000100  043536          BIT     #ECH,78$        ;ARE ERRORS ENABLED ??
    513 042210  001410                          BEQ     53$             ;NO !!
```

```
    514 042212  032737  004000  001370          BIT     #ECI,RMOFI      ;IS ECI SET ??
    515 042220  001004                          BNE     53$             ;YES !!
    516 042222  032737  100000  001352          BIT     #DCK,RMER1I     ;IS DCK ALSO SET ??
    517 042230  001002                          BNE     54$             ;YES !!
    518 042232  042716  000100          53$:    BIC     #ECH,(SP)       ;DISABLE ECH
    519 042236  013737  001352  001142  54$:    MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
    520 042244  042637  001142                  BIC     (SP)+,$BDDAT    ;CLEAR ECH IF ENABLED
    521 042250  001412                          BEQ     55$             ;BRANCH IF ECH IS OK
    522 042252  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
    523 042256  112776  000031  000000          MOVB    #31,@(SP)       ;WRITE ERROR NUMBER IN CALL
    524 042264  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
    525 042270  004736                          JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
    526 042272  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR
    527 042276                          55$:
    528
    529                                 ;;**************************************************************************
    530                                 ;*PERFORM THE REMAINING ERROR CHECKS FOR DATA TRANSFER COMMANDS
    531                                 ;;**************************************************************************
    532
    533 042276  022737  000030  043544          CMP     #SEARCH,81$     ;WAS DATA TRANSFERRED ?
    534 042304  103402                          BLO     56$             ;BR IF YES
    535 042306  000137  043510                  JMP     75$             ;NO - EXIT
    536
    537                                 ;REPORT ERROR IF RMWC NOT ZERO AND TRE IS ZERO
    538 042312  013737  001340  001142  56$:    MOV     RMWCI,$BDDAT    ;WORD COUNT ZERO??
    539 042320  001421                          BEQ     57$             ;YES
    540 042322  032737  040000  001336          BIT     #TRE,RMCS1I     ;TRANSFER ERROR DETECTED??
    541 042330  001015                          BNE     57$             ;YES!!
    542 042332  062716  000004                  ADD     #4,(SP)
    543 042336  112776  000015  000000          MOVB    #15,@(SP)       ;ERROR NUMBER
    544 042344  005037  001140                  CLR     $GDDAT          ;GOOD DATA FOR TYPEOUT
    545 042350  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    546 042354  004736                          JSR     PC,@(SP)+       ;REPORT WORD COUNT NOT ZERO
    547 042356  162716  000010                  SUB     #10,(SP)        ;RESTORE (SP)
    548 042362  000240                          NOP
    549
    550                                 ;REPORT ERROR IF RMBA IS NOT CORRECT
    551 042364  013737  001340  001140  57$:    MOV     RMWCI,$GDDAT    ;GET WORD COUNT AT END OF TRANSFER AND
    552 042372  163737  001414  001140          SUB     RMWCO,$GDDAT    ;SUBTRACT STARTING WORD COUNT.
    553 042400  006337  001140                  ASL     $GDDAT          ;* 2
    554 042404  063737  001416  001140          ADD     RMBAO,$GDDAT    ;ADD STARTING BUS ADDRESS
    555
    556 042412  032737  000010  001346          BIT     #BAI,RMCS2I     ;WAS BUS ADDRESS INHIBIT (BAI) SET ??
    557 042420  001403                          BEQ     58$             ;NO !!
    558 042422  013737  001416  001140          MOV     RMBAO,$GDDAT    ;ADDRESS SHOULD NOT HAVE CHANGED
    559
    560 042430  023737  001140  001342  58$:    CMP     $GDDAT,RMBAI    ;BUS ADDRESS OK??
    561 042436  001416                          BEQ     59$             ;YES!!
    562 042440  013737  001342  001142          MOV     RMBAI,$BDDAT    ;BAD DATA FOR TYPEOUT
    563 042446  062716  000004                  ADD     #4,(SP)
    564 042452  112776  000016  000000          MOVB    #16,@(SP)       ;ERROR NUMBER
    565 042460  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    566 042464  004736                          JSR     PC,@(SP)+       ;REPORT UNEXPECTED ADDRESS
    567 042466  162716  000010                  SUB     #10,(SP)        ;RESTORE (SP)
    568 042472  000240                          NOP
    569
    570                                 ;COMPUTE NUMBER OF SECTORS TRANSFERRED FROM WORD COUNT
```

```
                                        59$:    CLR     -(SP)           ;NUMBER OF SECTORS TRANSFERRED
                                                MOV     RMWCI,-(SP)     ;GET WORD COUNT AT END OF TRANSFER AND
                                                SUB     RMWCO,(SP)      ;SUBTRACT STARTING WORD COUNT.

                                                MOV     #256.,-(SP)     ;ASSUME 256. WORDS PER SECTOR
                                                BIT     #BIT1,RMCS1O    ;HEADER & DATA COMMAND ??
                                                BEQ     60$             ;NO !!
                                                ADD     #2,(SP)         ;CHANGE TO 258. WORDS PER SECTOR

                                        60$:    INC     4(SP)           ;INCREMENT SECTOR COUNT
                                                SUB     (SP),2(SP)      ;SUBTRACT ONE SECTOR'S WORTH
                                                BGT     60$             ;CONTINUE IF NOT DONE
                                                CMP     (SP)+,(SP)+     ;RESTORE STACK

                                        ;COMPUTE EXPECTED SECTOR, TRACK AND CYLINDER ADDRESS FROM
                                        ;NUMBER OF SECTORS
                                                MOV     RMDCO,78$       ;STORE ORIGINAL CYLINDER
                                                MOV     RMDAO,79$       ;STORE ORIGINAL TRACK
                                                MOV     RMDAO,80$       ;STORE ORIGINAL SECTOR
                                                MOV     LSTRK,82$       ;STORE LAST TRACK,
                                                SWAB    82$             ;GET TRACK ADDRESS TO LO BYTE AND
                                                INC     82$             ;INCREMENT TO GET TOTL # OF TRACKS.

                                                BIC     #^CTADMSK,79$   ;SAVE TRACK ADDRESS BITS AND
                                                SWAB    79$             ;GET TRACK ADDRESS TO LO BYTE.
                                                BIC     #^CSADMSK,80$   ;SAVE SECTOR ADDRESS BITS
                                                ADD     (SP)+,80$

                                                BIT     #SSEI,RMOFO     ;WAS SSEI SET ?
                                                BEQ     61$             ;NO !!

                                                CMP     80$,#32.        ;SECTOR OVEFLOWED??
                                                BLO     63$             ;NO!!
                                                INC     79$             ;INCREMENT TRACK
                                                SUB     #32.,80$        ;ADJUST SECTOR

                                        61$:    CMP     80$,#31.        ;SECTOR OVERFLOWED ?
                                                BLO     63$             ;NO !!
                                        62$:    INC     79$             ;INCREMENT TRACK
                                                SUB     #31.,80$        ;ADJUST SECTOR
                                                BR      61$             ;TRY AGAIN

                                        63$:    CMP     79$,82$         ;TRACK OVERFLOWED??
                                                BLO     64$             ;NO!!
                                                INC     78$             ;INCREMENT CYLINDER
                                                SUB     82$,79$         ;ADJUST TRACK
                                                BR      63$             ;TRY AGAIN
                                                NOP

                                        ;REPORT ERROR IF "SSEI" IS SET AFTER TRACK SWITCHING OCCURED
                                        ;THRU DATA TRANSFER
                                        64$:    CLR     $GDDAT          ;SETUP EXPECTED SSEI = 0
                                                MOV     RMOFI,$BDDAT    ;GET RECIEVED DATA AND
                                                BIC     #^CSSEI,$BDDAT  ;SAVE SSEI BIT FOR COMPARE.

                                                BIT     #SSEI,RMOFO     ;WAS SSEI SET BEFORE DATA TRANSFER ?
                                                BEQ     66$             ;NO
```

```
                                        CMPB    RMDAO+1,RMDAI+1 ;DID TRACK SWITCH OCCUR ?
                                        BEQ     65$             ;NO
                                        TST     $BDDAT          ;IS SSEI STILL SET ?
                                        BEQ     68$             ;NO
                                        ADD     #4,(SP)         ;POINT TO ERROR
                                        MOVB    #225,@(SP)      ;DEFINE ERROR NUMBER
                                        BR      67$

                                ;REPORT ERROR IF "SSEI" IS INCORRECT
                                65$:    MOV     #SSEI,$GDDAT    ;SETUP EXPECTED SSEI = 1
                                66$:    CMP     $GDDAT,$BDDAT   ;IS SSEI CORRECT ?
                                        BEQ     68$             ;YES
                                        ADD     #4,(SP)         ;POINT TO ERROR
                                        MOVB    #226,@(SP)      ;DEFINE ERROR NUMBER
                                67$:    SUB     #2,(SP)         ;ADJUST RETURN TO ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR
                                        SUB     #10,(SP)        ;RESTORE (SP)
                                        NOP

                                ;REPORT ERROR IF "LBT" IS NOT CORRECT
                                68$:    CLR     $GDDAT          ;SET GOOD DATA FOR LBT = 0
                                        CMP     78$,#560.       ;SHOULD LBT BE SET??
                                        BLOS    69$             ;NO!!
                                        BIT     #IAE,RMER1I     ;WAS IAE SET ??
                                        BNE     69$             ;YES - LBT SHOULD NOT BE SET
                                        MOV     #LBT,$GDDAT     ;SET GOOD DATA FOR LBT = 1
                                69$:    MOV     RMDSI,$BDDAT    ;BAD DATA FOR TYPEOUT
                                        BIC     #^CLBT,$BDDAT
                                        CMP     $GDDAT,$BDDAT   ;IS LBT CORRECT??
                                        BEQ     70$             ;YES!!
                                        ADD     #4,(SP)
                                        MOVB    #17,@(SP)       ;ERROR NUMBER
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                        JSR     PC,@(SP)+       ;REPORT LBT IS WRONG
                                        SUB     #10,(SP)        ;RESTORE (SP)
                                        NOP

                                ;REPORT ERROR IF "AOE" IS INCORRECT
                                70$:    CLR     $GDDAT          ;SET FOR AOE = 0
                                        BIT     #IAE,RMER1I     ;WAS "IAE" DETECTED??
                                        BNE     72$             ;YES-"AOE" SHOULD BE ZERO
                                        CMP     78$,#560.       ;SHOULD AOE BE SET??
                                        BLOS    72$             ;NO!!
                                        TST     79$             ;MAYBE
                                        BNE     71$             ;YES
                                        TST     80$
                                        BNE     71$             ;YES !!
                                        BIT     #F2,81$ ;WAS THIS READ OR WRITE CHECK ??
                                        BEQ     72$             ;NO !!
                                        TST     RMWCI           ;WAS ALL DATA TRANSFERRED ??
                                        BEQ     72$             ;YES !!
                                71$:    MOV     #AOE,$GDDAT     ;SET FOR AOE = 1
                                        CLR     79$             ;CLEAR EXPECTED TRACK
                                        MOV     #1,80$          ;EXPECT SECTOR = 1
                                72$:    MOV     RMER1I,$BDDAT   ;BAD DATA FOR TYPEOUT
                                        BIC     #^CAOE,$BDDAT
                                        CMP     $GDDAT,$BDDAT   ;IS AOE CORRECTY??
```

```
                                                BEQ     73$             ;YES!!
                                                ADD     #4,(SP)
                                                MOVB    #20,@(SP)       ;ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT AOE IS WRONG
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP

                                        ;REPORT ERROR IF RMDA IS NOT CORRECT
                                        73$:    BIT     #IAE,RMER1I     ;WAS THERE AN IAE ERROR ??
                                                BNE     75$             ;YES - DONT CHECK RMDA,RMDC
                                                MOV     79$,$GDDAT      ;SETUP EXPECTED DISK ADDRESS
                                                SWAB    $GDDAT
                                                MOVB    80$,$GDDAT
                                                MOV     RMDAI,$BDDAT    ;SETUP RECEIVED DISK ADDRESS
                                                CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED & RECEIVED
                                                BEQ     74$             ;BRANCH IF EQUAL
                                                ADD     #4,(SP)
                                                MOVB    #21,@(SP)       ;ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT BAD DISK ADDRESS
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP

                                        ;REPORT ERROR IF RMDC IS INCORRECT
                                        74$:    MOV     78$,$GDDAT      ;SETUP EXPECTED CYLINDER
                                                BIC     #^C1777,$GDDAT
                                                MOV     RMDCI,$BDDAT    ;SETUP RECEIVED CYLINDER
                                                CMP     $GDDAT,$BDDAT   ;COMPARE CYLINDERS
                                                BEQ     75$             ;BRANCH IF EQUAL
                                                ADD     #4,(SP)
                                                MOVB    #22,@(SP)       ;ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT BAD CYLINDER
                                                SUB     #10,(SP)        ;RESTORE (SP)
                                                NOP

                                        75$:    ADD     #4,(SP)         ;MOVE (SP) TO ERROR CALL
                                                TSTB    @(SP)           ;WAS ERROR FOUND??
                                                BEQ     76$
                                                ADD     #4,(SP)         ;MOVE (SP) TO ERROR RETURN
                                                BR      77$
                                        76$:    SUB     #4,(SP)         ;MOVE (SP) TO NO ERROR RETURN
                                        77$:    RTS     PC

                                        78$:    .WORD   0               ;CYLINDER
                                        79$:    .WORD   0               ;TRACK
                                        80$:    .WORD   0               ;SECTOR
                                        81$:    .WORD   0               ;FUNCTION CODE
                                        82$:    .WORD   0               ;TOTAL # OF TRACKS = LAST TRACK +1
```

```
                                .SBTTL  COMPOSITE ERROR CHECK SUBROUTINE
                                ;
                                ;THIS SUBROUTINE CHECKS THE STORED CONTENTS OF RMER1 AND
                                ;RMER2 AFTER MASKING EACH REGISTER WORD WITH THE USER'S STATUS
                                ;MASKS AND REPORTS AN ERROR IF ANY BITS ARE LEFT ON AFTER
                                ;THE MASKS ARE APPLIED.
                                ;
                                ;CALL:
                                ;(1)     JSR     PC,CMPERRSTS
                                ;       .WORD                   MASK FOR ERROR REGISTER 1
                                ;       .WORD                   MASK FOR ERROR REGISTER 2
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS
                                ;
                                ;NOTE:  BITS TO BE MASKED SHOULD BE ONE; BITS TO BE TESTED SHOULD
                                ;BE ZERO
                                ;
043550                          CMPERRSTS:
                                ;
                                ;MASK AND STORE THE CONTENTS OF RMER1  AND RMER2
043550  013737  001352  001176          MOV     RMER1I,$TMP1    ;STORE RMER1 AT TEMP STORAGE
043556  047637  000000  001176          BIC     @(SP),$TMP1     ;MASK   RMER1
043564  062716  000002                  ADD     #2,(SP)         ;MOVE SP TO NEXT MASK
043570  013737  001400  001200          MOV     RMER2I,$TMP2    ;STORE RMER2 AT TEMP STORAGE
043576  047637  000000  001200          BIC     @(SP),$TMP2     ;MASK RMER2
                                ;
                                ;
                                ;CLEAR USER'S ERROR CALL
043604  062716  000006                  ADD     #6,(SP)         ;MOVE SP TO USER'S ERROR CALL
043610  105076  000000                  CLRB    @(SP)           ;CLEAR ERROR NUMBER
043614  162716  000004                  SUB     #4,(SP)         ;LEAVE SP AT NO ERROR RETURN
                                ;
                                ;SEE IF THERE WERE ANY ERRORS IN RMER1, I.E., $TMP1
043620  005737  001176                  TST     $TMP1           ;ANY ERRORS TO REPORT??
043624  001420                          BEQ     1$              ;NO !!
043626  013737  001176  001142          MOV     $TMP1,$BDDAT    ;RECEIVED STATUS FOR TYPEOUT
043634  005037  001140                  CLR     $GDDAT          ;EXPECTED STATUS FOR TYPEOUT
043640  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
043644  112776  000066  000000          MOVB    #66,@(SP)       ;CORRECTABLE DATA CHECK ERROR #
043652  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
043656  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
043660  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO BRANCH
043664  000240                          NOP
043666                          1$:
                                ;
                                ;SEE IF THERE ARE ANY ERRORS TO REPORT IN RMER2 ($TMP2)
043666  005737  001200                  TST     $TMP2           ;ANY ERRORS IN RMER2?
043672  001420                          BEQ     2$              ;NO!!
                                ;
043674  013737  001200  001142          MOV     $TMP2,$BDDAT    ;RECEIVED STATUS FOR TYPEOUT
043702  005037  001140                  CLR     $GDDAT          ;EXPECTED STATUS FOR TYPEOUT
043706  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
043712  112776  000067  000000          MOVB    #67,@(SP)       ;WRITE ERROR NUMBER IN USER'S CALL
043720  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
```

```
     58 043724  004736                        JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
     59 043726  162716  000010                SUB     #10.,(SP)       ;MOVE SP TO NO ERROR RETURN
     60 043732  000240                        NOP
     61 043734                          2$:
     62
     63                                 ;AUGMENT THE RETURN ADDRESS IF ANY ERROR WAS DETECTED
     64 043734  062716  000004                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
     65 043740  105776  000000                TSTB    @(SP)           ;WAS THERE AN ERROR CALLED??
     66 043744  001403                        BEQ     3$              ;NO!!
     67 043746  062716  000004                ADD     #4,(SP)         ;YES - MOVE SP TO ERROR RETURN
     68 043752  000402                        BR      4$
     69 043754  162716  000004          3$:   SUB     #4,(SP)         ;MOVE SP TO NO ERROR RETURN
     70 043760  000207                  4$:   RTS     PC              ;RETURN TO USER
```

DEVICE SELECT SUBROUTINE

```
                                .SBTTL  DEVICE SELECT SUBROUTINE

                                ; THIS SUBROUTINE SELECTS THE DEVICE, GETTING THE DEVICE NUMBER FROM THE
                                ; TEST QUEUE.

                                ;CALL:
                                ;(1)    JSR     PC,DEVSEL
                                ;(2)    BR      ??                      RETURN IF NO ERROR
                                ;(3)    NOP                             RETURN IF ERROR
                                ;(4)    ERROR                           ERROR DEFINED BY SUBROUTINE

043762                          DEVSEL:

                                ;CLEAR USER'S ERROR CALL
043762  062716  000004                  ADD     #4,(SP)                 ;MOVE SP TO USER'S ERROR
043766  105076  000000                  CLRB    @(SP)                   ;CLEAR LOW ORDER BYTE OF CALL
043772  162716  000004                  SUB     #4,(SP)                 ;MOVE SP BACK

                                ;SAVE USER'S INFORMATION AND SETUP REGISTERS
043776  013746  000004                  MOV     ERRVEC,-(SP)            ;;PUSH ERRVEC ON STACK
044002  013746  000006                  MOV     ERRVEC+2,-(SP)                  ;;PUSH ERRVEC+2 ON STACK
044006  010046                          MOV     R0,-(SP)                ;;PUSH R0 ON STACK
044010  010146                          MOV     R1,-(SP)                ;;PUSH R1 ON STACK
044012  012737  044132  000004          MOV     #2$,ERRVEC              ;SETUP FOR BUS TIMEOUT
044020  012737  000300  000006          MOV     #PR6,ERRVEC+2
044024  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS
044032  013701  001466                  MOV     TSTQUE,R1               ;R1 POINTS TO DEVICE NUMBER

                                ;SELECT DEVICE AND VERIFY THAT DEVICE IS AVAILABLE
044036  111160  000010                  MOVB    (R1),RMCS2(R0)          ;WRITE UNIT SELECT BITS
044042  016037  000000  001176          MOV     RMCS1(R0),$TMP1         ;GET "DVA" STATUS
044050  016037  000010  001174          MOV     RMCS2(R0),$TMP0         ;GET "NED" STATUS

044056  032737  010000  001174          BIT     #NED,$TMP0              ;IS DEVICE NONEXISTENT ?
044064  001407                          BEQ     1$                      ;NO!!
044066  062766  000004  000010          ADD     #4,10(SP)               ;MOVE SP TO USERS ERROR CALL
044074  112776  000111  000010          MOVB    #111,@10(SP)            ;WRITE ERROR NUMBER
044102  000422                          BR      3$

044104  032737  004000  001176  1$:     BIT     #DVA,$TMP1              ;IS DEVICE AVAILABLE ?
044112  001021                          BNE     4$                      ;YES!!
044114  062766  000004  000010          ADD     #4,10(SP)               ;MOVE SP TO USERS ERROR CALL
044122  112776  000112  000010          MOVB    #112,@10(SP)            ;WRITE ERROR NUMBER
044130  000407                          BR      3$

                                ;HANDLE BUS TIMEOUT
044132  022626                  2$:     CMP     (SP)+,(SP)+             ;ADJUST SP
044134  062766  000004  000010          ADD     #4,10(SP)               ;MOVE SP TO USERS ERROR CALL
044142  112776  000113  000010          MOVB    #113,@10(SP)            ;WRITE BUS TIMEOUT ERROR NUMBER
044150  162766  000002  000010  3$:     SUB     #2,10(SP)               ;ADJUST RETURN TO 'NOP' PRECEDING
                                                                        ;THE ERROR CALL

                                ;RESTORE USERS DATA AND RETURN TO ADDRESS ON STACK
044156                          4$:
044156  012601                          MOV     (SP)+,R1                ;;POP STACK INTO R1
044160  012600                          MOV     (SP)+,R0                ;;POP STACK INTO R0
044162  012637  000006                  MOV     (SP)+,ERRVEC+2                  ;;POP STACK INTO ERRVEC+2
```

DEVICE SELECT SUBROUTINE

```
        044166  012637  000004                 MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
     52 044172  000207                         RTS     PC              ;EXIT
```

```
                                .SBTTL  SEEK STATUS CHECK SUBROUTINE

                                ;THIS SUBROUTINE VERIFIES THE RESULTS OF SEEK TESTS USING STATUS
                                ;STORED IN THE GET BUFFER AND TEST PARAMETERS STORED IN THE PUT BUFFER.
                                ;
                                ;THE SUBROUTINE RETURNS TO THE CALLING ROUTINE IF AN ERROR IS DETECTED
                                ;AFTER HAVING LOADED THE APPROPRIATE ERROR NUMBER IN THE "ERROR" TRAP
                                ;OF THE CALLING ROUTINE.  SEEK STATUS IS CHECKED AS FOLLOWS:
                                ;
                                ;CALL:
                                ;(1)     JSR     PC,SEKSTS
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS

044174                          SEKSTS:

                                ;CLEAR USERS' ERROR CALL
044174  000240                          NOP
044176  062716  000004                  ADD     #4,(SP)         ;MOVE (SP) TO ERROR CALL
044202  105076  000000                  CLRB    @(SP)           ;CLEAR ERROR NUMBER
044206  162716  000004                  SUB     #4,(SP)         ;MOVE (SP) TO NO ERROR RETURN
044212  005037  045452                  CLR     20$             ;CLEAR ERROR FLAGS

                                ;TEST FOR MASSBUS CONTROL BUS PARITY ERROR WHEN WRITING
                                ;LOCAL REGISTERS, I.E., "PAR"  = 1 AND "DPE" = 0
044216  032737  000010  001352          BIT     #PAR,RMER1I     ;WAS PARITY ERROR DETECTED??
044224  001424                          BEQ     1$              ;NO!!
044226  032737  000010  001400          BIT     #DPE,RMER2I     ;WAS IT DUE TO CONTROL BUS??
044234  001020                          BNE     1$              ;NOT SURE!!

                                ;REPORT REGISTER PARITY ERROR VIA USER'S ERROR CALL
044236  005037  001140                  CLR     $GDDAT          ;EXPECTED STATUS
044242  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECCIVED STATUS
044250  062716  000004                  ADD     #4,(SP)         ;MOVE STACK TO USER'S ERROR
044254  112776  000050  000000          MOVB    #50,@(SP)       ;ERROR #50
044262  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
044266  004736                          JSR     PC,@(SP)+
044270  162716  000010                  SUB     #10,(SP)        ;RESTORE STACK
044274  000447                          BR      3$              ;IAE SHOULD  BE ZERO

                                ;DETERMINE THE VALUE OF "IAE" STATUS BASED ON TRACK, SECTOR, CYLINDER
                                ;AND THE STATUS OF "SSEI" BIT DURING A SEEK OPERATION. ALSO, SET "SKI"
                                ;IF CYLINDER ADDRESS IS TOO LARGE.
044276  012737  002000  001140  1$:     MOV     #IAE,$GDDAT     ;SETUP FOR IAE = 1
044304  052737  040000  045452          BIS     #SKI,20$        ;SETUP FOR SKI = 1
044312  023727  001446  001060          CMP     RMDC0,#560.     ;GREATER THAN LAST CYLINDER ?
044320  101035                          BHI     3$              ;YES - CYLINDER IS INVALID
044322  042737  040000  045452          BIC     #SKI,20$        ;CLEAR SKI ERROR FLAG

044330  123737  001421  001335          CMPB    RMDA0+1,LSTRK+1 ;GREATER THAN LAST TRACK ?
044336  101026                          BHI     3$              ;YES - TRACK IS INVALID

044340  123727  001420  000035          CMPB    RMDA0,#29.      ;SECTOR > 29. ?
```

SEEK STATUS CHECK SUBROUTINE

```
                                                BLOS    2$              ;BR IF NO
                                                BIT     #FMT16,RMOFO    ;18 BIT FORMAT ?
                                                BEQ     3$              ;YES - SECTOR IS INVALID FOR 18 BIT MODE
                                                CMPB    RMDA0,#30.      ;SECTOR > 30. ?
                                                BLOS    2$              ;BR IF NO
                                                BIT     #SSEI,RMOFO     ;IS SSEI CLEAR ?
                                                BEQ     3$              ;YES - SECTOR IS INVALID FOR 16 BIT MODE
                                                CMPB    RMDA0,#31.      ;SECTOR > 31. ?
                                                BHI     3$              ;YES - SECTOR IS INVALID

                                        2$:     CLR     $GDDAT          ;"IAE" SHOULD = 0

                                        ;COMPARE EXPECTED AND RECIEVED "IAE" STATUS
                                        3$:     MOV     RMER1I,$BDDAT   ;IS IAE OK??
                                                BIC     #^CIAE,$BDDAT   ;SAVE IAE BIT FOR COMPARE
                                                CMP     $GDDAT,$BDDAT   ;CORRECT "IAE" STATUS ?
                                                BNE     4$              ;BR IF NO
                                                BIC     #SKI,20$        ;CLEAR SKI FLAG
                                                BR      5$              ;GO CHECK NEXT ERROR
                                        4$:
                                        ;REPORT INCORRECT "IAE" STATUS VIA USER'S ERROR CALL
                                                ADD     #4,(SP)
                                                MOVB    #51,@(SP)       ;ERROR 51
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT INCORRECT IAE
                                                SUB     #10,(SP)                ;RESTORE (SP)
                                                NOP
                                        5$:

                                        ;REPORT ANY IVC ERROR AS
                                        ;       IVC ERROR WITH VOLUME VALID ZERO
                                        ;       ERRONEOUS IVC ERROR, VOLUME VALID IS SET
                                                BIT     #IVC,RMER2I     ;IVC ERROR??
                                                BEQ     7$              ;NO!!
                                                CLR     $GDDAT          ;EXPECTED STATUS
                                                MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
                                                MOVB    #60,@(SP)       ;ERROR 60 IF VV = 0
                                                BIT     #VV,RMDS1
                                                BEQ     6$
                                                MOVB    #61,@(SP)       ;ERROR 61 IF VV = 1
                                        6$:     SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
                                                SUB     #10,(SP)        ;RESTORE SP
                                                NOP

                                        7$:     MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                                BIC     #^CSKI,$BDDAT   ;CLEAR DONT CARES
                                                MOV     20$,$GDDAT      ;GET EXPECTED SKI STATUS
                                                BIC     #^CSKI,$GDDAT   ;CLEAR DONT CARES
                                                BEQ     8$              ;BRANCH IF 0 EXPECTED

                                        ;REPORT ERROR IF SKI IS NOT SET (IAE WAS NOT DETECTED)
                                                BIT     #SKI,$BDDAT     ;WAS SKI DETECTED ??
                                                BNE     9$              ;YES !!
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #267,@(SP)      ;WRITE ERROR NUMBER
```

```
                                        SUB     #2,(SP)         ;MOVE SP TO ERROR RETURN
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        BR      10$             ;GO TO NEXT ERROR CHECK
                                8$:

                                ;REPORT ERROR IF SKI IS SET
                                        BIT     #SKI,$BDDAT     ;IS SKI SET ??
                                        BEQ     9$              ;NO - SKI IS OK
                                        ADD     #4,(SP)         ;MOVE (SP) TO ERROR
                                        MOVB    #54,@(SP)       ;LOAD ERROR NUMBER
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                        JSR     PC,@(SP)+       ;REPORT SEEK ERROR
                                        SUB     #10,(SP)        ;RESTORE (SP)
                                        NOP

                                ;REPORT ANY DEVICE CHECK
                                9$:     BIT     #DVC,RMER2I     ;WAS THERE DVC DURING SEEK??
                                        BEQ     10$             ;NO!!
                                        CLR     $GDDAT          ;EXPECTED STATUS
                                        MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)
                                        MOVB    #55,@(SP)       ;ERROR  #55
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
                                        SUB     #10,(SP)        ;RESTORE SP
                                        NOP

                                ;REPORT ANY "OPI" ERROR AS OPI WITH MOL  = 0, OR  OPI
                                ;BECAUSE ON CYLINDER LATCH DIDN'T RESET
                                10$:    BIT     #OPI,RMER1I     ;"OPI" ERROR??
                                        BEQ     12$             ;NO!!
                                        CLR     $GDDAT          ;EXPECTED STATUS
                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE (SP) TO ERROR
                                        MOVB    #52,@(SP)       ;LOAD ERROR NUMBER
                                        BIT     #MOL,RMDSI      ;WAS MEDIUM ON LINE??
                                        BEQ     11$             ;NO!!
                                        MOVB    #53,@(SP)       ;YES - CHANGE ERROR NUMBER
                                11$:    SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
                                        JSR     PC,@(SP)+       ;REPORT "OPI" ERROR
                                        SUB     #10,(SP)        ;RESTORE (SP)
                                        NOP

                                ;SEE IF "PIP" = 0, AND "ATA", "MOL" AND "VV" = 1
                                12$:    MOV     RMDSI,-(SP)
                                        BIC     #^C<ATA!PIP!MOL!VV>,(SP)
                                        CMP     #ATA!MOL!VV,(SP)+
                                        BNE     13$             ;ERROR IN RMDS
                                        JMP     17$             ;RMDS IS OK

                                ;REPORT ERROR IF MOL = 0 AND OPI = 0
                                13$:    BIT     #MOL,RMDSI      ;IS MOL RESET??
                                        BNE     14$             ;NO - MOL IS SET
                                        BIT     #OPI,RMER1I     ;WAS OPI SET
                                        BNE     14$             ;YES - DONT REPORT ERROR
                                        MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
```

```
    172 045120  052737  010000  001140          BIS     #MOL,$GDDAT
    173 045126  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
    174 045134  062716  000004                  ADD     #4,(SP)
    175 045140  112776  000062  000000          MOVB    #62,@(SP)
    176 045146  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    177 045152  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
    178 045154  162716  000010                  SUB     #10,(SP)
    179 045160  000240                          NOP
    180
    181                             ;REPORT AN ERROR IF "PIP" IS STIL SET AND SKI NOT SET
    182 045162  032737  020000  001350  14$:    BIT     #PIP,RMDSI      ;IS "PIP" STILL SET??
    183 045170  001430                          BEQ     15$             ;NO!!
    184 045172  032737  040000  001400          BIT     #SKI,RMER2I     ;WAS "SKI"SET??
    185 045200  001024                          BNE     15$             ;YES-DONT REPORT PIP
    186 045202  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
    187 045210  042737  020000  001142          BIC     #PIP,$BDDAT
    188 045216  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
    189 045224  062716  000004                  ADD     #4,(SP)         ;MOVE (SP) TO ERROR
    190 045230  112776  000056  000000          MOVB    #56,@(SP)       ;LOAD ERROR NUMBER
    191 045236  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    192 045242  004736                          JSR     PC,@(SP)+       ;REPORT "PIP" SET AFTER SEEK
    193 045244  162716  000010                  SUB     #10,(SP)                ;RESTORE (SP)
    194 045250  000240                          NOP
    195
    196                             ;REPORT AN ERROR IF "ATA" IS NOT SET
    197 045252  032737  100000  001350  15$:    BIT     #ATA,RMDSI      ;WAS "ATA" SET ??
    198 045260  001024                          BNE     16$             ;YES!!
    199 045262  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
    200 045270  052737  110600  001140          BIS     #ATA!MOL!DPR!DRY,$GDDAT
    201 045276  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
    202 045304  062716  000004                  ADD     #4,(SP)         ;MOVE (SP) TO ERROR
    203 045310  112776  000057  000000          MOVB    #57,@(SP)       ;LOAD ERROR NUMBER
    204 045316  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    205 045322  004736                          JSR     PC,@(SP)+       ;REPORT ATTENTION NOT SET DURING
    206                                                                 ;SEEK TEST
    207 045324  162716  000010                  SUB     #10,(SP)                ;RESTORE (SP)
    208 045330  000240                          NOP
    209
    210                             ;REPORT ERROR IF VOLUME VALID IS RESET AND IVC IS ZERO
    211 045332  032737  000100  001350  16$:    BIT     #VV,RMDSI       ;IS VV = 0 ??
    212 045340  001030                          BNE     17$             ;NO!!
    213 045342  032737  010000  001400          BIT     #IVC,RMER2I     ;IS IVC ALSO 0 ??
    214 045350  001024                          BNE     17$             ;NO - IVC IS SET
    215 045352  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
    216 045360  052737  000100  001140          BIS     #VV,$GDDAT
    217 045366  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
    218 045374  062716  000004                  ADD     #4,(SP)
    219 045400  112776  000064  000000          MOVB    #64,@(SP)       ;ERROR #64
    220 045406  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    221 045412  004736                          JSR     PC,@(SP)+
    222 045414  162716  000010                  SUB     #10,(SP)
    223 045420  000240                          NOP
    224 045422                      17$:
    225
    226                             ;MODIFY THE RETURN ADDRESS IF AN ERROR WAS DETECTED
    227 045422  000240                          NOP
    228 045424  062716  000004                  ADD     #4,(SP)         ;MOVE (SP) TO ERROR CALL
```

```
229 045430  105776  000000                TSTB    @(SP)           ;WAS ERROR CALLED??
230 045434  001403                        BEQ     18$             ;NO!!
231 045436  062716  000004                ADD     #4,(SP)         ;MOVE TO ERROR RETURN
232 045442  000402                        BR      19$
233
234 045444  162716  000004          18$:  SUB     #4,(SP)         ;MOVE (SP) TO NO ERROR RETURN
235 045450  000207                  19$:  RTS     PC              ;RETURN
236
237 045452  000000                  20$:  .WORD   0               ;ERROR FLAGS
```

CONTROLLER CLEAR SUBROUTINE

```
                                        .SBTTL  CONTROLLER CLEAR SUBROUTINE
                                        ;
                                        ;THIS SUBROUTINE CLEARS THE MASSBUS CONTROLLER, MASSBUS ADAPTERS,
                                        ;AND DRIVES, THEN SELECTS THE DRIVE.
                                        ;
                                        ;CALL:  JSR     PC,CNTCLR
                                        ;       BR      ???             RETURN HERE IF NO ERROR FOUND
                                        ;       NOP                     RETURN HERE IF ANY ERROR FOUND
                                        ;       ERROR                   SUB DEFINES ERROR NUMBER
                                        ;       ???
                                        ;
                                        CNTCLR:
045454  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
045456  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
045460  013746  000004                  MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
045464  013746  000006                  MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
045470  012737  045530  000004          MOV     #1$,ERRVEC      ;SETUP FOR BUS TIMEOUT
045476  012737  000300  000006          MOV     #PR6,ERRVEC+2
045504  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS
045510  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR MASSBUS
045516  013701  001466                  MOV     TSTQUE,R1       ;GET DEVICE UNDER TEST
045522  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT DEVICE
045526  000412                          BR      2$
                                        ;
045530  022626                  1$:     CMP     (SP)+,(SP)+     ;ADJUST STACK
045532  062766  000004  000010          ADD     #4,10(SP)       ;MOVE SP TO USER'S ERROR CALL
045540  112776  000007  000010          MOVB    #7,@10(SP)      ;WRITE THE ERROR NUMBER
045546  162766  000002  000010          SUB     #2,10(SP)       ;ADJUST SP TO RETURN TO ERROR
045554                          2$:
045554  012637  000006                  MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
045560  012637  000004                  MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
045564  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
045566  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
045570  000207                          RTS     PC
```

```
                                        .SBTTL  CONTROLLER CLEAR STATUS CHECK SUBROUTINE
                                        ;
                                        ;THIS SUBROUTINE VERIFIES THAT THE SUBSYSTEM IS INITIALIZED BASED ON
                                        ;STATUS STORED IN THE GET BUFFER.  THIS SUBROUTINE SHOULD ONLY BE
                                        ;USED FOLLOWING A CONTROLLER CLEAR OPERATION, I.E., WRITING A 1 IN BIT
                                        ;5 OF RMCS2, BECAUSE THE ERROR MESSAGES ARE BASED ON THAT CONDITION.
                                        ;
                                        ;STATUS PERTINENT TO THE DEVICE IS NOT CHECKED.  IN PARTICULAR, THE
                                        ;FOLLOWING STATUS BITS ARE NOT CHECKED:
                                        ;
                                        ;       ATA,ERR,PIP,MOL,WRL,LBT,PGM,VV,OM,UNS,SKI,DVC
                                        ;
                                        ;
                                        ;CALL:
                                        ;(1)    JSR     PC,CLRSTS
                                        ;       BR      ???             RETURN HERE IF NO ERROR
                                        ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                        ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                        ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                        ;       ???                     RETURN HERE IF NO MORE ERRORS
                                        ;
045572                                  CLRSTS:
                                        ;
                                        ;CLEAR USER'S ERROR CALL
045572  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR
045576  105076  000000                  CLRB    @(SP)           ;CLEAR ERROR NUMBER
045602  162716  000004                  SUB     #4,(SP)         ;MOVE SP BACK TO NO ERROR
                                        ;REPORT ERROR IF RMCS1 NOT INITIALIZED
045606  013737  001336  001142  1$:     MOV     RMCS1I,$BDDAT   ;VERIFY RMCS1
045614  042737  100000  001142          BIC     #SC,$BDDAT      ;IGNORE SPECIAL CONDITION
045622  012737  004200  001140          MOV     #DVA!RDY,$GDDAT ;EXPECT DVA & RDY
045630  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED, RECEIVED
045636  001413                          BEQ     2$              ;BRANCH IF EQUAL
045640  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
045644  112776  000126  000000          MOVB    #126,@(SP)      ;WITE ERROR NUMBER IN CALL
045652  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
045656  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
045660  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
045664  000240                          NOP
                                        ;REPORT ERROR IF RMBA NOT RESET
045666  005037  001140          2$:     CLR     $GDDAT          ;VERIFY RMBA IS ZERO
045672  013737  001342  001142          MOV     RMBAI,$BDDAT
045700  001413                          BEQ     3$              ;BRANCH IF ZERO
045702  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
045706  112776  000127  000000          MOVB    #127,@(SP)      ;WITE ERROR NUMBER IN CALL
045714  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
045720  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
045722  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
045726  000240                          NOP
                                        ;REPORT ERROR IF RMCS2 NOT INITIALIZED
045730  013737  001346  001142  3$:     MOV     RMCS2I,$BDDAT   ;VERIFY RMCS2
045736  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
045740  005046                          CLR     -(SP)           ;EXPECT IR & UNIT NUMBER
045742  013701  001466                  MOV     TSTQUE,R1       ;R1 = ADDRESS OF TEST QUE
045746  111116                          MOVB    (R1),(SP)
045750  052716  000100                  BIS     #IR,(SP)
045754  012637  001140                  MOV     (SP)+,$GDDAT
```

```
                                                MOV     (SP)+,R1            ;;POP STACK INTO R1
045760  012601                                  CMP     $GDDAT,$BDDAT       ;COMPARE EXPECTED & RECEIVED
045762  023737  001140  001142                  BEQ     4$                  ;BRANCH IF EQUAL
045770  001413                                  ADD     #4,(SP)             ;MOVE SP TO USER'S ERROR CALL
045772  062716  000004                          MOVB    #130,@(SP)          ;WITE ERROR NUMBER IN CALL
046000  112776  000130  000000                  SUB     #2,(SP)             ;MOVE SP TO RETURN FOR ERROR
046004  162716  000002                          JSR     PC,@(SP)+           ;REPORT ERROR VIA USER
046010  004736                                  SUB     #10,(SP)            ;MOVE SP BACK TO NO ERROR
046012  162716  000010                          NOP
046016  000240
                                        ;REPORT ERROR IF RMER1 NOT RESET-IGNORE UNS
                                        4$:     CLR     $GDDAT              ;VERIFY RMER1
046020  005037  001140                          MOV     RMER1I,$BDDAT
046024  013737  001352  001142                  BIC     #UNS,$BDDAT         ;IGNORE UNSAFE
046032  042737  040000  001142                  BEQ     5$                  ;BRANCH IF ZERO
046040  001413                                  ADD     #4,(SP)             ;MOVE SP TO USER'S ERROR CALL
046042  062716  000004                          MOVB    #131,@(SP)          ;WITE ERROR NUMBER IN CALL
046046  112776  000131  000000                  SUB     #2,(SP)             ;MOVE SP TO RETURN FOR ERROR
046054  162716  000002                          JSR     PC,@(SP)+           ;REPORT ERROR VIA USER
046060  004736                                  SUB     #10,(SP)            ;MOVE SP BACK TO NO ERROR
046062  162716  000010                          NOP
046066  000240
                                        ;REPORT ERROR IF RMMR1 NOT INITIALIZED-IGNORE WC,LS,LST
046070  013737  001362  001142            5$:     MOV     RMMR1I,$BDDAT       ;VERIFY RMMR
046076  042737  000046  001142                  BIC     #WC!LS!LST,$BDDAT       ;IGNORE WORD CLOCK, SCT, TRK
046104  012737  000010  001140                  MOV     #MWD,$GDDAT         ;EXPECT WRITE DATA BIT
046112  023737  001140  001142                  CMP     $GDDAT,$BDDAT       ;COMPARE EXPECTED AND RECEIVED
046120  001413                                  BEQ     6$                  ;BRANCH IF 0
046122  062716  000004                          ADD     #4,(SP)             ;MOVE SP TO USER'S ERROR CALL
046126  112776  000133  000000                  MOVB    #133,@(SP)          ;WITE ERROR NUMBER IN CALL
046134  162716  000002                          SUB     #2,(SP)             ;MOVE SP TO RETURN FOR ERROR
046140  004736                                  JSR     PC,@(SP)+           ,REPORT ERROR VIA USER
046142  162716  000010                          SUB     #10,(SP)            ;MOVE SP BACK TO NO ERROR
046146  000240                                  NOP
                                        ;REPORT AN ERROR IF RMEC2 IS NOT RESET
                                        6$:     CLR     $GDDAT              ;EXPECT ZEROS
046150  005037  001140                          MOV     RMEC2I,$BDDAT       ;VERIFY RMEC2=0
046154  013737  001404  001142                  BEQ     7$
046162  001413                                  ADD     #4,(SP)             ;MOVE SP TO USER'S ERROR CALL
046164  062716  000004                          MOVB    #135,@(SP)          ;WITE ERROR NUMBER IN CALL
046170  112776  000135  000000                  SUB     #2,(SP)             ;MOVE SP TO RETURN FOR ERROR
046176  162716  000002                          JSR     PC,@(SP)+           ;REPORT ERROR VIA USER
046202  004736                                  SUB     #10,(SP)            ;MOVE SP BACK TO NO ERROR
046204  162716  000010                          NOP
046210  000240
                                        ;REPORT ERROR IF RMMR2 NOT INITIALIZED-IGNORE RQA,RQB
046212  013737  001376  001142            7$:     MOV     RMMR2I,$BDDAT       ;VERIFY RMMR2
046220  042737  140000  001142                  BIC     #RQA!RQB,$BDDAT
046226  012737  011777  001140                  MOV     #TST!1777,$GDDAT        ;EXPECT TEST BIT ON
046234  023737  001140  001142                  CMP     $GDDAT,$BDDAT
046242  001413                                  BEQ     8$
046244  062716  000004                          ADD     #4,(SP)             ;MOVE SP TO USER'S ERROR CALL
046250  112776  000136  000000                  MOVB    #136,@(SP)          ;WITE ERROR NUMBER IN CALL
046256  162716  000002                          SUB     #2,(SP)             ;MOVE SP TO RETURN FOR ERROR
046262  004736                                  JSR     PC,@(SP)+           ;REPORT ERROR VIA USER
046264  162716  000010                          SUB     #10,(SP)            ;MOVE SP BACK TO NO ERROR
046270  000240                                  NOP
                                        ;REPORT ERROR IF RMER2 NOT RESET-IGNORE SKI,DVC
046272  005037  001140                    8$:     CLR     $GDDAT              ;EXPECT ALL ZEROS
046276  013737  001400  001142                  MOV     RMER2I,$BDDAT       ;VERIFY RMER2
```

CONTROLLER CLEAR STATUS CHECK SUBROUTINE

```
    115 046304  042737  040200  001142          BIC     #SKI!DVC,$BDDAT ;IGNORE DEVICE ERRORS
    116 046312  001413                          BEQ     9$              ;BRANCH IF OTHER BITS 0
    117 046314  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    118 046320  112776  000174  000000          MOVB    #174,@(SP)      ;WITE ERROR NUMBER IN CALL
    119 046326  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    120 046332  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
    121 046334  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
    122 046340  000240                          NOP
    123                             ;REPORT ERROR IF RMDS NOT INITIALIZED
    124 046342  013737  001350  001142  9$:     MOV     RMDSI,$BDDAT    ;TEST DRIVE STATUS REGISTER
    125 046350  042737  177177  001142          BIC     #^C<DRY!DPR>,$BDDAT
    126 046356  012737  000600  001140          MOV     #DPR!DRY,$GDDAT ;EXPECTED DRIVE STATUS
    127 046364  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED & RECEIVED
    128 046372  001413                          BEQ     10$             ;BRANCH IF EQUAL
    129 046374  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    130 046400  112776  000134  000000          MOVB    #134,@(SP)      ;WRITE ERROR NUMBER
    131 046406  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    132 046412  004736                          JSR     PC,@(SP)+       ;REPORT ERROR TO USER
    133 046414  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
    134 046420  000240                          NOP
    135 046422  062716  000004          10$:    ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
    136 046426  105776  000000                  TSTB    @(SP)           ;WAS AN ERROE DETECTED??
    137 046432  001403                          BEQ     11$             ;NO!!
    138 046434  062716  000004                  ADD     #4,(SP)         ;YES - MOVE TO ERROR RETURN
    139 046440  000402                          BR      12$
    140 046442  162716  000004          11$:    SUB     #4,(SP)         ;MOVE SP TO NO ERROR RETURN
    141 046446  000240                  12$:    NOP
    142 046450  000207                          RTS     PC
```

```
                                .SBTTL  PACK ACKNOWLEDGE STATUS CHECK
                                
                                ;THIS SUBROUTINE CHECKS THE RESULTS OF A PACK ACKNOWLEDGE
                                ;COMMAND USING THE STATUS STORED IN THE GET BUFFER.  ERRORS ARE
                                ;REPORTED TO THE USER VIA THE USER'S ERROR CALL.
                                
                                ;CALL:
                                ;(1)    JSR     PC,ACKSTS
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS
                                
046452                          ACKSTS:
                                
                                ;CLEAR USER'S ERROR CALL
046452  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
046456  105076  000000                  CLRB    @(SP)           ;CLEAR LOW ORDER BYTE
046462  162716  000004                  SUB     #4,(SP)         ;MOVE SP BACK
                                
                                ;REPORT AN ERROR  IF "VV" IS 0
046466  032737  000100  001350          BIT     #VV,RMDSI       ;IS VOLUME VALID SET??
046474  001024                          BNE     1$              ;YES!!
046476  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
046504  052737  000100  001140          BIS     #VV,$GDDAT
046512  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
046520  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
046524  112776  000155  000000          MOVB    #155,@(SP)      ;WRITE NUMBER IN ERROR CALL
046532  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
046536  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR
046540  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO BRANCH
046544  000240                          NOP
046546                          1$:
                                
                                ;REPORT AN ERROR IF "MOL" IS 0
046546  032737  010000  001350          BIT     #MOL,RMDSI      ;IS MOL SET??
046554  001024                          BNE     2$              ;YES!!
046556  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
046564  052737  010000  001140          BIS     #MOL,$GDDAT
046572  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
046600  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
046604  112776  000041  000000          MOVB    #41,@(SP)       ;WRITE NUMBER OF ERROR IN CALL
046612  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
046616  004736                          JSR     PC,@(SP)+       ;REPORT TH ERROR
046620  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO BRANCH
046624  000240                          NOP
046626                          2$:
                                
                                ;SEE IF "UNS","OPI","RMR","ILR", OR "ILF" IS SET
046626  032737  060007  001352          BIT     #UNS!OPI!RMR!ILR!ILF,RMER1I
046634  001570                          BEQ     7$
                                
                                ;REPORT AN ERROR IF "UNS" IS SET
046636  032737  040000  001352          BIT     #UNS,RMER1I     ;WAS UNS SET??
046644  001424                          BEQ     3$              ;NO!!
046646  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
```

PACK ACKNOWLEDGE STATUS CHECK

```
     58 046654  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
     59 046662  042737  040000  001140          BIC     #UNS,$GDDAT
     60 046670  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     61 046674  112776  000042  000000          MOVB    #42,@(SP)       ;WRITE NUMBER OF ERROR IN CALL
     62 046702  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
     63 046706  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
     64 046710  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
     65 046714  000240                          NOP
     66 046716                          3$:
     67
     68                                 ;REPORT ANY OPI ERROR
     69 046716  032737  020000  001352          BIT     #OPI,RMER1I     ;WAS OPI SET ??
     70 046724  001424                          BEQ     4$              ;NO!!
     71 046726  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
     72 046734  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
     73 046742  042737  020000  001140          BIC     #OPI,$GDDAT
     74 046750  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     75 046754  112776  000043  000000          MOVB    #43,@(SP)       ;WRITE NUMBER OF ERROR IN CALL
     76 046762  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
     77 046766  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
     78 046770  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
     79 046774  000240                          NOP
     80 046776                          4$:
     81
     82                                 ;REPORT ANY RMR ERROR
     83 046776  032737  000004  001352          BIT     #RMR,RMER1I     ;WAS RMR SET??
     84 047004  001424                          BEQ     5$              ;NO!!
     85 047006  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
     86 047014  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
     87 047022  042737  000004  001140          BIC     #RMR,$GDDAT
     88 047030  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     89 047034  112776  000044  000000          MOVB    #44,@(SP)       ;WRITE NUMBER OF ERROR IN CALL
     90 047042  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
     91 047046  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
     92 047050  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
     93 047054  000240                          NOP
     94 047056                          5$:
     95
     96                                 ;REPORT ANY     ILR ERROR
     97 047056  032737  000002  001352          BIT     #ILR,RMER1I     ;WAS ILR SET??
     98 047064  001424                          BEQ     6$              ;NO!!
     99 047066  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
    100 047074  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
    101 047102  042737  000002  001140          BIC     #ILR,$GDDAT
    102 047110  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
    103 047114  112776  000045  000000          MOVB    #45,@(SP)       ;WRITE NUMBER OF ERROR IN CALL
    104 047122  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    105 047126  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
    106 047130  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
    107 047134  000240                          NOP
    108 047136                          6$:
    109
    110                                 ;REPORT ANY     ILF ERROR
    111 047136  032737  000001  001352          BIT     #ILF,RMER1I     ;WAS ILF SET??
    112 047144  001424                          BEQ     7$              ;NO!!
    113 047146  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
    114 047154  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
```

PACK ACKNOWLEDGE STATUS CHECK

```
    115 047162  042737  000001  001140          BIC     #ILF,$GDDAT
    116 047170  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
    117 047174  112776  000046  000000          MOVB    #46,@(SP)       ;WRITE NUMBER OF ERROR IN CALL
    118 047202  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    119 047206  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
    120 047210  162716  000010                  SUB     #10.,(SP)       ;MOVE SP TO NO ERROR RETURN
    121 047214  000240                          NOP
    122 047216                          7$:
    123
    124                                 ;AUGMENT RETURN ADDRESS IF ERROR WAS FOUND
    125 047216  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
    126 047222  105776  000000                  TSTB    @(SP)           ;WAS ERROR FOUND??
    127 047226  001403                          BEQ     8$              ;NO!!
    128 047230  062716  000004                  ADD     #4,(SP)         ;YES - MOVE TO ERROR RETURN
    129 047234  000402                          BR      9$
    130 047236  162716  000004          8$:     SUB     #4,(SP)         ;MOVE SP TO NO ERROR RETURN
    131 047242  000240                  9$:     NOP
    132 047244  000207                          RTS     PC
```

```
                                .SBTTL  RECALIBRATE STATUS CHECK SUBROUTINE

                                ;THIS SUBROUTINE CHECKS THE RESULTS OF A RECALIBRATE OPERATION
                                ;USING THE STATUS STORED IN THE GET BUFFER.

                                ;CALL:
                                ;
                                ;(1)    JSR     PC,RCLSTS       ;CALL SUBROUTINE
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS

047246                          RCLSTS:

                                ;CLEAR USER'S ERROR NUMBER
047246  062716  000004                  ADD     #4,(SP)
047252  105076  000000                  CLRB    @(SP)           ;CLEAR USER'S ERROR CALL
047256  162716  000004                  SUB     #4,(SP)         ;MOVE SP BACK TO BRANCH


                                ;SEE IF "PAR" OR "ILF" OR "OPI" OR "IAE" IS SET
047262  032737  022011  001352          BIT     #OPI!PAR!ILF!IAE,RMER1I
047270  001553                  BEQ     5$              ;NONE ARE SET - GO TO NEXT CHECK

                                ;REPORT ANY MASSBUS CONTROL BUS PARITY ERROR, I.E.,
                                ;"PAR" = 1 AND "DPE" = 0
047272  032737  000010  001352          BIT     #PAR,RMER1I     ;WAS "PAR" SET??
047300  001430                  BEQ     1$              ;NO!!
047302  032737  000010  001400          BIT     #DPE,RMER2I     ;WAS "DPE" SET??
047310  001024                  BNE     1$              ;YES - NOT A REGISTER ERROR
047312  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
047320  042737  000010  001140          BIC     #PAR,$GDDAT
047326  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
047334  062716  000004                  ADD     #4,(SP) ;MOVE SP TO USER'S ERROR CALL
047340  112776  000050  000000          MOVB    #50,@(SP)       ;WRITE ERROR NUMBER IN CALL
047346  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
047352  004736                  JSR     PC,@(SP)+       ;GO REPORT ERROR
047354  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO BRANCH
047360  000240                  NOP
047362                          1$:

                                ;REPORT ANY "ILF" ERROR
047362  032737  000001  001352          BIT     #ILF,RMER1I     ;WAS "ILF" SET??
047370  001424                  BEQ     2$              ;NO!!
047372  013737  001352  001140          MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
047400  042737  000001  001140          BIC     #ILF,$GDDAT
047406  013737  001352  001142          MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
047414  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
047420  112776  000071  000000          MOVB    #71,@(SP)       ;WRITE ERROR NUMBER IN CALL
047426  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
047432  004736                  JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
047434  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO BRANCH
047440  000240                  NOP
047442                          2$:
```

```
                                        ;REPORT ANY "OPI" ERROR AS
                                        ;       . OPI DUE TO "MOL" = 0
                                        ;       . OPI BECAUSE ON CYLINDER LATCH DIDN'T RESET
047442  032737  020000  001352            BIT     #OPI,RMER1I     ;WAS OPI SET??
047450  001433                            BEQ     4$              ;NO!!
047452  013737  001352  001140            MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
047460  042737  020000  001140            BIC     #OPI,$GDDAT
047466  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
047474  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
047500  112776  000072  000000            MOVB    #72,@(SP)       ;WRITE ERROR NUMBER IN USER'S CALL
047506  032737  010000  001350            BIT     #MOL,RMDSI      ;WAS "MOL" = 0??
047514  001403                            BEQ     3$              ;YES!!
047516  112776  000073  000000            MOVB    #73,@(SP)       ;NO - CHANGE ERROR NUMBER
047524  162716  000002            3$:     SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
047530  004736                            JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
047532  162716  000010                    SUB     #10,(SP)        ;MOVE SP BACK TO BRANCH
047536  000240                            NOP
047540                            4$:

                                        ;REPORT AN ERROR IF "IAE" IS SET
047540  032737  002000  001352            BIT     #IAE,RMER1I     ;IS "IAE" SET??
047546  001424                            BEQ     5$              ;NO!!
047550  013737  001352  001140            MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
047556  042737  002000  001140            BIC     #IAE,$GDDAT
047564  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
047572  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
047576  112776  000070  000000            MOVB    #70,@(SP)       ;WRITE ERROR NUMBER IN USER'S CALL
047604  162716  000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
047610  004736                            JSR     PC,@(SP)+       ;REPORT ERROR
047612  162716  000010                    SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR RETURN
047616  000240                            NOP
047620                            5$:

                                        ;SEE IF "SKI" OR "IVC" OR "DVC" IS SET
047620  032737  050200  001400            BIT     #SKI!IVC!DVC,RMER2I
047626  001517                            BEQ     9$              ;NONE OF THE BITS ARE SET


                                        ;REPORT ANY "IVC" ERROR AS
                                        ;       .IVC WITH VV = 0
                                        ;       .ERRONEOUS IVC ERROR
047630  032737  010000  001400            BIT     #IVC,RMER2I     ;WAS IVC SET??
047636  001433                            BEQ     7$              ;NO!!
047640  013737  001400  001140            MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
047646  042737  010000  001140            BIC     #IVC,$GDDAT
047654  013737  001400  001142            MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
047662  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
047666  112776  000074  000000            MOVB    #74,@(SP)       ;WRITE ERROR NUMBER IN CALL
047674  032737  000100  001350            BIT     #VV,RMDSI       ;WAS VV = 0??
047702  001403                            BEQ     6$              ;YES!!
047704  112776  000075  000000            MOVB    #75,@(SP)       ;NO - CHANGE ERROR NUMBER
047712  162716  000002            6$:     SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
047716  004736                            JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
047720  162716  000010                    SUB     #10,(SP)        ;MOVE SP BACK TO BRANCH
047724  000240                            NOP
047726                            7$:
```

```
                                        ;REPORT ANY "SKI" ERROR
047726  032737  040000  001400                BIT     #SKI,RMER2I     ;WAS SKI SET??
047734  001424                              BEQ     8$              ;NO!!
047736  013737  001400  001140              MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
047744  042737  040000  001140              BIC     #SKI,$GDDAT
047752  013737  001400  001142              MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
047760  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
047764  112776  000076  000000              MOVB    #76,@(SP)       ;WRITE ERROR NUMBER
047772  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
047776  004736                              JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
050000  162716  000010                      SUB     #10,(SP)        ;MOVE SP TO BRANCH
050004  000240                              NOP
050006                                  8$:

                                        ;REPORT ANY "DVC" ERROR
050006  032737  000200  001400              BIT     #DVC,RMER2I     ;WAS "DVC" SET??
050014  001424                              BEQ     9$              ;NO!!
050016  013737  001400  001140              MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
050024  042737  000200  001140              BIC     #DVC,$GDDAT
050032  013737  001400  001142              MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
050040  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
050044  112776  000077  000000              MOVB    #77,@(SP)       ;WRITE ERROR NUMBER
050052  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
050056  004736                              JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
050060  162716  000010                      SUB     #10,(SP)        ;MOVE SP TO USER'S BRANCH
050064  000240                              NOP
050066                                  9$:

                                        ;SEE IF "PIP" AND "OM" ARE 0, AND "ATA","MOL" AND "VV" ARE 1
050066  013746  001350                      MOV     RMDSI,-(SP)     ;PUT RMDS ON STACK
050072  042716  047676                      BIC     #^C<PIP!MOL!VV!OM!ATA>,(SP)
050076  022726  110100                      CMP     #ATA!MOL!VV,(SP)+
050102  001002                              BNE     10$
050104  000137  050520                      JMP     15$
050110                                  10$:

                                        ;REPORT AN ERROR IF MOL = 0 AND OPI = 0, I.E., MEDIUM WENT OFF
                                        ;LINE AFTER RECALIBRATE WAS INITIATED
050110  032737  010000  001350              BIT     #MOL,RMDSI      ;DID MOL DROP??
050116  001030                              BNE     11$             ;NO!!
050120  032737  020000  001352              BIT     #OPI,RMER1I     ;WAS OPI ERROR REPORTED??
050126  001024                              BNE     11$             ;YES - DON'T REPORT MOL=0
050130  013737  001350  001140              MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
050136  052737  010000  001140              BIS     #MOL,$GDDAT
050144  013737  001350  001142              MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
050152  062716  000004                      ADD     #4,(SP) ;MOVE SP TO USER'S ERROR CALL
050156  112776  000100  000000              MOVB    #100,@(SP)      ;WRITE ERROR NUMBER
050164  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
050170  004736                              JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
050172  162716  000010                      SUB     #10,(SP)        ;MOVE SP BACK TO USER'S BRANCH
050176  000240                              NOP
050200                                  11$:

                                        ;REPORT AN ERROR IF "VV" = 0 AND "IVC" = 0
050200  032737  000100  001350              BIT     #VV,RMDSI       ;DID "VV" DROP??
050206  001030                              BNE     12$             ;NO!!
050210  032737  010000  001400              BIT     #IVC,RMER2I     ;WAS THERE A IVC ERROR??
```

```
050216  001024                          BNE     12$             ;YES - DONT REPORT VV=0
050220  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
050226  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
050234  052737  000100  001140          BIS     #VV,$GDDAT
050242  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
050246  112776  000101  000000          MOVB    #101,@(SP)      ;WRITE ERROR NUMBER IN CALL
050254  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
050260  004736                          JSR     PC,@(SP)+
050262  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO USER'S BRANCH
050266  000240                          NOP
050270                          12$:

                                ;REPORT AN ERROR IF ATA IS NOT SET
050270  032737  100000  001350          BIT     #ATA,RMDSI      ;WAS ATA SET DURING RECALIBRATE??
050276  001024                          BNE     13$             ;YES!!
050300  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
050306  052737  100000  001140          BIS     #ATA,$GDDAT
050314  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
050322  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
050326  112776  000102  000000          MOVB    #102,@(SP)      ;WRITE ERROR NUMBER IN CALL
050334  162716  000002                  SUB     #2,(SP)
050340  004736                          JSR     PC,@(SP)+
050342  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO USER'S BRANCH
050346  000240                          NOP
050350                          13$:

                                ;REPORT AN ERROR IF "OM" IS NOT ZERO BECAUSE RECALIBRATE SHOULD
                                ;ALWAYS CLEAR OFFSET MODE
050350  032737  000001  001350          BIT     #OM,RMDSI       ;WAS "OM" RESET??
050356  001424                          BEQ     14$             ;YES!!
050360  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
050366  042737  000001  001140          BIC     #OM,$GDDAT
050374  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
050402  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
050406  112776  000103  000000          MOVB    #103,@(SP)      ;WRITE ERROR NUMBER
050414  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
050420  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
050422  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO USER'S BRANCH
050426  000240                          NOP
050430                          14$:

                                ;REPORT AN ERROR IF "PIP" IS STIL ON, I.E., DRIVE NOT ON
                                ;CYLINDER
050430  032737  020000  001350          BIT     #PIP,RMDSI      ;IS DRIVE OFF CYLINDER??
050436  001430                          BEQ     15$             ;NO!!
050440  032737  040000  001400          BIT     #SKI,RMER2I     ;WAS "SKI" DETECTED??
050446  001024                          BNE     15$             ;YES-DONT REPORT "PIP"
050450  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
050456  042737  020000  001140          BIC     #PIP,$GDDAT
050464  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
050472  062716  000004                  ADD     #4,(SP) ;MOVE SP TO USER'S ERROR CALL
050476  112776  000104  000000          MOVB    #104,@(SP)      ;WRITE ERROR NUMBER
050504  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
050510  004736                          JSR     PC,@(SP)+
050512  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO USER'S BRANCH
050516  000240                          NOP
```

```
    229 050520                                  15$:
    230
    231                                         ;SEE IF "ILR" OR "RMR" OR "UNS" IS SET
    232 050520  032737  040006  001352                BIT     #ILR!RMR!UNS,RMER1I
    233 050526  001514                              BEQ     18$
    234
    235                                         ;REPORT AN ERROR IF "ILR" IS SET
    236 050530  032737  000002  001352                BIT     #ILR,RMER1I     ;WAS ILR SET DURING RECALIBRATE??
    237 050536  001424                              BEQ     16$             ;NO!!
    238 050540  013737  001352  001140              MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
    239 050546  042737  000002  001140              BIC     #ILR,$GDDAT
    240 050554  013737  001352  001142              MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
    241 050562  062716  000004                      ADD     #4,(SP) ;MOVE SP TO USER'S ERROR CALL
    242 050566  112776  000105  000000              MOVB    #105,@(SP)      ;WRITE ERROR NUMBER IN CALL
    243 050574  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    244 050600  004736                              JSR     PC,@(SP)+
    245 050602  162716  000010                      SUB     #10,(SP)        ;MOVE SP TO USER'S BRANCH
    246 050606  000240                              NOP
    247 0.                                  16$:
    248
    249                                         ;REPORT AN ERROR IF "RMR" IS SET
    250 050610      737  000004  001352                BIT     #RMR,RMER1I     ;WAS RMR SET??
    251 050616  001424                              BEQ     17$             ;NO!!
    252 050620  013737  001352  001140              MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
    253 050626  042737  000004  001140              BIC     #RMR,$GDDAT
    254 050634  013737  001352  001142              MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
    255 050642  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    256 050646  112776  000106  000000              MOVB    #106,@(SP)      ;WRITE ERROR NUMBER IN USER'S CALL
    257 050654  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    258 050660  004736                              JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
    259 050662  162716  000010                      SUB     #10,(SP)        ;MOVE SP TO USER'S BRANCH
    260 050666  000240                              NOP
    261 050670                              17$:
    262
    263                                         ;REPORT AN ERROR IF "UNS" IS SET AND "DVC" IS 0
    264 050670  032737  040000  001352                BIT     #UNS,RMER1I     ;WAS UNSAFE ON??
    265 050676  001430                              BEQ     18$             ;NO!!
    266 050700  032737  000200  001400              BIT     #DVC,RMER2I     ;WAS THERE A DEVICE CHECK??
    267 050706  001024                              BNE     18$             ;YES - DON'T REPORT UNSAFE
    268 050710  013737  001352  001140              MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
    269 050716  042737  040000  001140              BIC     #UNS,$GDDAT
    270 050724  013737  001352  001142              MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
    271 050732  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    272 050736  112776  000107  000000              MOVB    #107,@(SP)      ;WRITE ERROR NUMBER
    273 050744  162716  000002                      SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    274 050750  004736                              JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
    275 050752  162716  000010                      SUB     #10,(SP)        ;MOVE SP BACK TO USER'S BRANCH
    276 050756  000240                              NOP
    277 050760                              18$:
    278
    279                                         ;AUGMENT THE RETURN ADDRESS IF ANY ERROR WAS DETECTED
    280 050760  062716  000004                      ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    281 050764  105776  000000                      TSTB    @(SP)           ;WAS AN ERROR REPORTED??
    282 050770  001403                              BEQ     19$             ;NO!!
    283 050772  062716  000004                      ADD     #4,(SP)         ;YES - AUGMENT SP RETURN
    284 050776  000402                              BR      20$
    285 051000  162716  000004          19$:        SUB     #4,(SP) ;NO ERROR - RETURN SP TO BRANCH
```

RECALIBRATE STATUS CHECK SUBROUTINE

```
    286 051004  000240                 20$:    NOP
    287 051006  000207                         RTS     PC              ;STATUS CECK IS COMPLETE
```

```
                                        .SBTTL  DRIVE CLEAR STATUS CHECK SUBROUTINE

                                        ;       BR      ???             RETURN HERE IF NO ERROR
                                        ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                        ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                        ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                        ;       ???                     RETURN HERE IF NO MORE ERRORS

051010                                  DRVSTS:

                                        ;CLEAR USER'S ERROR CALL
051010  062716  000004                          ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
051014  105076  000000                          CLRB    @(SP)           ;CLEAR ERROR CALL
051020  162716  000004                          SUB     #4,(SP)         ;MOVE SP TO USER'S BRANCH
                                        ;REPORT ERROR IF RMCS1 NOT INITIALIZED
051024  013737  001336  001142  1$:     MOV     RMCS1I,$BDDAT   ;CHECK RMCS1
051032  042737  173700  001142          BIC     #^C<DVA!FNCMSK>,$BDDAT  ;CLEAR DONT CARES
051040  012737  004010  001140          MOV     #DVA!DRVCLR,$GDDAT      ;EXPECT DVA
051046  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED & RECEIVED
051054  001443                          BEQ     3$              ;BRANCH IF EQUAL
051056  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
051062  112776  000141  000000          MOVB    #141,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
051070  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
051074  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
051076  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
051102  000240                          NOP
                                        ;REPORT ERROR IF RMDS NOT INITIALIZED
051104  013737  001350  001142  2$:     MOV     RMDSI,$BDDAT    ;CHECK RMDS
051112  042737  021101  001142          BIC     #PGM!OM!VV!PIP,$BDDAT   ;CLEAR DONT CARES
051120  012737  010600  001140          MOV     #MOL!DPR!DRY,$GDDAT     ;EXPECT DRY & DPR
051126  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED & RECEIVED
051134  001413                          BEQ     3$              ;BRANCH IF EQUAL
051136  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
051142  112776  000142  000000          MOVB    #142,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
051150  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
051154  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
051156  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
051162  000240                          NOP
                                        ;REPORT ERROR IF RMER1 NOT INITIALIZED
051164  005037  001140          3$:     CLR     $GDDAT          ;EXPECT 0'S
051170  013737  001352  001142          MOV     RMER1I,$BDDAT   ;CHECK RMER1
051176  001413                          BEQ     4$              ;BRANCH IF EQUAL
051200  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
051204  112776  000143  000000          MOVB    #143,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
051212  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
051216  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
051220  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
051224  000240                          NOP
                                        ;REPORT ERROR IF ATA NOT INITIALIZED
051226  013737  001354  001142  4$:     MOV     RMASI,$BDDAT    ;CHECK ATTENTION BIT
051234  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
051236  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
051240  013701  001466                  MOV     TSTQUE,R1
051244  116102  000001                  MOVB    1(R1),R2
051250  042702  177400                  BIC     #^CATNMSK,R2
051254  005102                          COM     R2
051256  040237  001142                  BIC     R2,$BDDAT
```

```
     58 051262  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
     59 051264  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
     60 051266  005737  001142                  TST     $BDDAT          ;IS ATTENTION CLEARED??
     61 051272  001413                          BEQ     5$              ;BRANCH IF ATTENTION CLEARED
     62 051274  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     63 051300  112716  000144  000000          MOVB    #144,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
     64 051306  162716  000002                  SUB     #2.(SP)         ;MOVE SP TO RETURN FOR ERROR
     65 051312  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
     66 051314  162716  000010                  SUB     #10.(SP)        ;MOVE SP TO NO ERROR RETURN
     67 051320  000240                          NOP
     68                             ;REPORT ERROR IF RMMR1 NOT INITIALIZED
     69 051322  013737  001362  001142  5$:     MOV     RMMR1I,$BDDAT   ;CHECK RMMR
     70 051330  042737  000046  001142          BIC     #WC!LS!LST,$BDDAT       ;CLEAR DONT CARES
     71 051336  012737  000010  001140          MOV     #MWD,$GDDAT     ;EXPECT WRITE DATA ON
     72 051344  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED AND RECEIVED
     73 051352  001413                          BEQ     6$              ;BRANCH IF ZERO
     74 051354  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     75 051360  112776  000145  000000          MOVB    #145,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
     76 051366  162716  000002                  SUB     #2.(SP)         ;MOVE SP TO RETURN FOR ERROR
     77 051372  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
     78 051374  162716  000010                  SUB     #10.(SP)        ;MOVE SP TO NO ERROR RETURN
     79 051400  000240                          NOP
     80                             ;REPORT ERROR IF RMMR2 NOT INITIALIZED
     81 051402  013737  001376  001142  6$:     MOV     RMMR2I,$BDDAT   ;CHECK RMMR2
     82 051410  042737  140000  001142          BIC     #RQA!RQB,$BDDAT ;CLEAR REQA, REQB
     83 051416  012737  011777  001140          MOV     #TST!1777,$GDDAT        ;EXPECT TEST BIT ON
     84 051424  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED & RECEIVED
     85 051432  001413                          BEQ     7$              ;BRANCH IF EQUAL
     86 051434  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     87 051440  112776  000146  000000          MOVB    #146,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
     88 051446  162716  000002                  SUB     #2.(SP)         ;MOVE SP TO RETURN FOR ERROR
     89 051452  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
     90 051454  162716  000010                  SUB     #10.(SP)        ;MOVE SP TO NO ERROR RETURN
     91 051460  000240                          NOP
     92 051462  005037  001140          7$:     CLR     $GDDAT          ;EXPECT ZEROS
     93                             ;REPORT ERROR IF RMEC2 NOT RESET
     94 051466  013737  001404  001142          MOV     RMEC2I,$BDDAT   ;CHECK RMEC2
     95 051474  001413                          BEQ     8$              ;BRANCH IF 0
     96 051476  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
     97 051502  112776  000150  000000          MOVB    #150,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
     98 051510  162716  000002                  SUB     #2.(SP)         ;MOVE SP TO RETURN FOR ERROR
     99 051514  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
    100 051516  162716  000010                  SUB     #10.(SP)        ;MOVE SP TO NO ERROR RETURN
    101 051522  000240                          NOP
    102                             ;REPORT ERROR IF RMER2 NOT RESET
    103 051524  013737  001400  001142  8$:     MOV     RMER2I,$BDDAT   ;CHECK RMER2
    104 051532  001413                          BEQ     9$              ;BRANCH IF NO ERROR
    105 051534  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
    106 051540  112776  000147  000000          MOVB    #147,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
    107 051546  162716  000002                  SUB     #2.(SP)         ;MOVE SP TO RETURN FOR ERROR
    108 051552  004736                          JSR     PC,@(SP)+       ;REPORT THE ERROR VIA USER
    109 051554  162716  000010                  SUB     #10.(SP)        ;MOVE SP TO NO ERROR RETURN
    110 051560  000240                          NOP
    111 051562                          9$:
    112
    113 051562                          10$:
    114
```

DRIVE CLEAR STATUS CHECK SUBROUTINE

```
115                                     ;AUGMENT RETURN ADDRESS IF ANY ERROR WAS FOUND
116 051562  062716  000004                     ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
117 051566  105776  000000                     TSTB    @(SP)           ;WAS AN ERROR DETECTED??
118 051572  001403                             BEQ     11$             ;NO!!
 19 051574  062716  000004                     ADD     #4,(SP)         ;YES - MOVE SP TO ERROR RETURN
1.  051600  000402                             BR      12$
1.  051602  162716  000004             11$:    SUB     #4,(SP) ;MOVE SP BACK TO NO ERROR RETURN
12  051606  000240                     12$:    NOP
123 051610  000207                             RTS     PC              ;RETURN TO USER
```

DATA TRANSFER COMMAND STATUS CHECK SUBROUTINE

```
                                        .SBTTL  DATA TRANSFER COMMAND STATUS CHECK SUBROUTINE

                                        ;THIS SUBROUTINE VERIFIES THE RESULTS OF ALL DATA TRANSFER COMMANDS
                                        ;USING STATUS STORED IN THE GET BUFFER AND TEST PARAMETERS
                                        ;STORED IN THE PUT BUFFER.  ERRORS ARE REPORTED BY WRITING
                                        ;THE ERROR NUMBER IN THE USERS ERROR CALL.

                                        ;USER'S SUBROUTINE CALL:
                                        ;(1)    JSR     PC,DTASTS
                                        ;(2)    BR      ??              RETURN HERE IF NO DATA ERRORS
                                        ;(3)    NOP                     RETURN HERE TO REPORT AN ERROR
                                        ;(4)    ERROR                   SUB WRITES ERROR NUMBER
                                        ;(5)    JSR     PC,@(SP)+       USER RETURNS FOR MORE CHECKS
                                        ;(6)    ??                      SUB RETURNS HERE AFTER ALL
                                        ;                               ERRORS ARE REPORTED

051612                                  DTASTS:

                                        ;CLEAR USER'S ERROR CALL AND ERROR FLAGS
051612  062716  000004                          ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
051616  105076  000000                          CLRB    @(SP)           ;CLEAR LOW ORDER BYTE OF TRAP
051622  162716  000004                          SUB     #4,(SP)         ;RESTORE SP TO NO ERROR
051626  005037  055226                          CLR     49$             ;CLEAR ERROR FLAGS

                                        ;REPORT ANY CONTROL BUS PARITY ERROR WHILE READING REMOTE REGISTERS,
                                        ;I.E., MCPE = 1
051632  032737  020000  001336                  BIT     #MCPE,RMCS1I    ;WAS THERE A PARITY ERROR??
051640  001422                                  BEQ     1$              ;NO!!
051642  013737  001336  001140                  MOV     RMCS1I,$GDDAT   ;EXPECTED STATUS
051650  042737  020000  001140                  BIC     #MCPE,$GDDAT
051656  013737  001336  001142                  MOV     RMCS1I,$BDDAT   ;RECEIVED STATUS
051664  062716  000004                          ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
051670  112776  000013  000000                  MOVB    #13,@(SP)       ;WRITE ERROR NUMBER
051676  162716  000002                          SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
051702  004736                                  JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
051704  000466                                  BR      4$
051706                                  1$:

                                        ;REPORT ANY CONTROL BUS PARITY ERROR WHILE WRITTING REMOTE REGISTERS,
                                        ;I.E., PAR = 1 AND DPE = 0
051706  032737  000010  001352                  BIT     #PAR,RMER1I     ;WAS THERE A PARITY ERROR??
051714  001435                                  BEQ     3$              ;NO!!
051716  032737  000010  001400                  BIT     #DPE,RMER2I     ;DATA PARITY ERROR ?
051724  001031                                  BNE     3$              ;YES!!
051726  013737  001352  001140                  MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
051734  042737  000010  001140                  BIC     #PAR,$GDDAT
051742  013737  001352  001142                  MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
051750  062716  000004                          ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
051754  112776  000050  000000                  MOVB    #50,@(SP)       ;WRITE ERROR NUMBER
051762  032737  001000  001346                  BIT     #MXF,RMCS2I     ;DID MXF GET SET??
051770  001003                                  BNE     2$              ;YES!!
051772  112776  000274  000000                  MOVB    #274,@(SP)      ;NO - CHANGE ERROR NUMBER
052000  162716  000002                  2$:     SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
052004  004736                                  JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
052006  000425                                  BR      4$

                                        ;LOOK FOR ANY ERRORS WHICH MAY HAVE OCCURRED DURING COMMAND INITIATION OR
```

```
                                        ;MECHANICAL POSITIONING
                                        ;
                                        ;FIRST TEST MXF WHICH WOULD INDICATE COMPOSITE ERROR SET WHEN FUNCTION
                                        ;CODE AND GO BIT WERE LOADED
052010                                  3$:
052010  032737  001000  001346                BIT     #MXF,RMCS2I     ;WAS 'MISSED TRANSFER" SET??
052016  001425                                BEQ     5$              ;NO!!
052020  013737  001346  001140                MOV     RMCS2I,$GDDAT   ;EXPECTED STATUS
052026  042737  001000  001140                BIC     #MXF,$GDDAT
052034  013737  001346  001142                MOV     RMCS2I,$BDDAT   ;RECEIVED STATUS
052042  062716  000004                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
052046  112776  000275  000000                MOVB    #275,@(SP)      ;WRITE ERROR NUMBER
052054  162716  000002                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
052060  004736                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
052062                                  4$:
                                        ;
                                        ;RESTORE SP TO NO ERROR RETURN AND BYPASS FURHTER STATUS CHECKING
052062  162716  000010                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR
052066  000137  055200                        JMP     46$             ;SKIP TO END OF SUB
                                        ;
052072                                  5$:
                                        ;
                                        ;REPORT AN ERROR IF "OPI" ERROR OCCURRED DUE TO "MOL" = 0, OR IF "OPI"
                                        ;AND "MOL" ARE SET, BUT "VV " IS RESET, INDICATING AN INTERMITTENT
                                        ;"MOL"
052072  032737  020000  001352                BIT     #OPI,RMER1I     ;IS "OPI" SET??
052100  001447                                BEQ     8$              ;NO!!
052102  013737  001352  001140                MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
052110  042737  020000  001140                BIC     #OPI,$GDDAT
052116  013737  001352  001142                MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
052124  032737  010000  001350                BIT     #MOL,RMDSI      ;WAS MEDIUM OFF LINE??
052132  001404                                BEQ     6$              ;YES!!
052134  032737  000100  001350                BIT     #VV,RMDSI       ;WAS "MOL" INTERMITTENT??
052142  001013                                BNE     7$              ;NO!!
052144  062716  000004                6$:     ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
052150  112776  000276  000000                MOVB    #276,@(SP)      ;WRITE ERROR NUMBER IN CALL
052156  162716  000002                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
052162  004736                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
052164  162716  000010                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
052170  000413                                BR      8$
052172                                  7$:
                                        ;
                                        ;REPORT "OPI" ERROR, WHICH IS DUE TO "ON CYLINDER" NOT DROPPING OR
                                        ;"RUN" TIMEOUT (20 MS) OR SEARCH TIMEOUT (50 MS)
052172  062716  000004                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
052176  112776  000277  000000                MOVB    #277,@(SP)      ;WRITE ERROR NUMBER IN CALL
052204  162716  000002                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
052210  004736                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
052212  162716  000010                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
052216  000240                                NOP
052220                                  8$:
                                        ;
                                        ;LOOK FOR "IVC" ERROR DURING COMMAND INITIATION
052220  032737  010000  001400                BIT     #IVC,RMER2I     ;WAS THERE AN "IVC" ERROR??
052226  001432                                BEQ     10$             ;NO!!
                                        ;REPORT "IVC" ERROR DUE TO "VV" = 0, OR REPORT ERRONEOUS "IVC" ERROR
052230  013737  001400  001140                MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
```

```
                                        BIC     #IVC,$GDDAT
                                        MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
                                        MOVB    #300,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                        BIT     #VV,RMDSI       ;WAS VOLUME VALID??
                                        BEQ     9$              ;NO!!
                                        MOVB    #301,@(SP)      ;CHANGE ERROR NUMBER
                                9$:     SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT "IVC" ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                10$:

                                ;SEE IF "ILF" OR "RMR" IS SET
                                        BIT     #ILR!ILF!RMR, RMER1I
                                        BEQ     13$             ;NO ERRORS DETECTED
                                ;REPORT AN ERROR IF "ILR" IS SET
                                        BIT     #ILR,RMER1I     ;WAS "ILR" DETECTED??
                                        BEQ     11$             ;NO!!
                                        MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                        BIC     #ILR,$GDDAT
                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                        MOVB    #302,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                11$:

                                ;REPORT AN ERROR IF "ILF" IS SET
                                        BIT     #ILF,RMER1I     ;WAS "ILF" DETECTED??
                                        BEQ     12$             ;NO!!
                                        MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                        BIC     #ILF,$GDDAT
                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                        MOVB    #303,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERORR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                12$:

                                ;REPORT AN ERROR IF "RMR" IS SET
                                        BIT     #RMR,RMER1I     ;WAS "RMR" DETECTED??
                                        BEQ     13$             ;NO!!
                                        MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                        BIC     #RMR,$GDDAT
                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                        MOVB    #304,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                13$:
                                ;DETERMINE WHETHER OR NOT "IAE" SHOULD BE SET AND CHECK FOR ERROR
```

```
                                                MOV     #IAE,$GDDAT     ;SETUP FOR "IAE" = 1
                                                BIS     #SKI,49$        ;SETUP FOR "SKI" = 1
                                                CMP     RMDC0,#560.     ;GREATER THAN LAST CYLINDER ?
                                                BHI     15$             ;YES - CYLINDER IS INVALID
                                                BIC     #SKI,49$        ;RESET SKI FLAG

                                                CMPB    RMDA0+1,LSTRK+1 ;GREATER THAN LAST TRACK ?
                                                BHI     15$             ;YES - TRACK IS INVALID

                                                CMPB    RMDA0,#29.      ;IS SECTOR > 29. ?
                                                BLOS    14$             ;NO
                                                BIT     #FMT16,RMOF0    ;18 BIT FORMAT ?
                                                BEQ     15$             ;YES - SECTOR IS INVALID FOR 18 BIT MODE
                                                CMPB    RMDA0,#30.      ;IS SECTOR > 30. ?
                                                BLOS    14$             ;NO
                                                BIT     #SSEI,RMOF0     ;IS SSEI CLEAR ?
                                                BEQ     15$             ;YES - SECTOR IS INVALID FOR 16 BIT MODE
                                                CMPB    RMDA0,#31.      ;IS SECTOR > 31. ?
                                                BHI     15$             ;YES - SECTOR IS INVALID
                                        14$:    CLR     $GDDAT          ;"IAE" SHOULD = 0

                                        15$:    MOV     RMER1I,$BDDAT   ;GET RECEIVED STATUS
                                                BIC     #^CIAE,$BDDAT
                                                CMP     $GDDAT,$BDDAT   ;IS "IAE" STATUS OK??
                                                BNE     16$             ;NO!!
                                                BIC     #SKI,49$        ;IAE OK - SKI SHOULD BE 0
                                                BR      17$
                                        16$:    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                                MOVB    #305,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        17$:

                                        ;REPORT AN ERROR IF "SKI" IS SET AND "IAE" STATUS WAS OK
                                                MOV     RMER2I,$BDDAT   ;RECEIVED STAT'S
                                                BIC     #^CSKI,$BDDAT
                                                MOV     49$,$GDDAT      ;EXPECTED STATUS
                                                BIC     #^CSKI,$GDDAT
                                                BIT     #SKI,RMER2I     ;WAS "SKI" SET??
                                                BEQ     18$             ;NO!!
                                                BIT     #SKI,49$        ;WAS SKI CAUSED BY IAE = 0??
                                                BNE     19$             ;YES - DON'T REPORT SKI
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #306,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                                BR      19$

                                        18$:

                                        ;REPORT AN ERROR IF SKI = 0 AND IAE WAS NOT DETECTED
                                                BIT     #SKI,49$        ;SHOULD SKI BE SET??
                                                BEQ     19$             ;NO!!
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                                MOVB    #307,@(SP)      ;WRITE ERROR NUMBER IN CALL
```

```
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                19$:

                                ;LOOK FOR "LSC" OR "LBC" OR "DVC" IN ERROR REGISTER #2
                                        BIT     #LSC!LBC!DVC,RMER2I
                                        BEQ     22$             ;NO ERRORS SET

                                ;REPORT ANY DEVICE FAULT, I.E., "DVC" = 1
                                        BIT     #DVC,RMER2I     ;IS "DVC" = 1??
                                        BEQ     20$             ;NO!!
                                        MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
                                        BIC     #DVC,$GDDAT
                                        MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USERS ERROR
                                        MOVB    #310,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                20$:

                                ;REPORT LOSS OF BIT CLOCK, I.E.; "LBC" = 1, IF "MOL" = 1
                                        BIT     #LBC,RMER2I     ;IS LBC SET??
                                        BEQ     21$             ;NO!!
                                        BIT     #MOL,RMDSI      ;WAS LBC ERROR BY MOL = 0
                                        BEQ     21$             ;YES!!
                                        MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
                                        BIC     #LBC,$GDDAT
                                        MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                        MOVB    #311,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                21$:

                                ;REPORT LOS OF SYSTEM CLOCK, I.E., "LSC" = 1
                                        BIT     #LSC,RMER2I     ;IS "LSC" = 1??
                                        BEQ     22$             ;NO!!
                                        MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
                                        BIC     #LSC,$GDDAT
                                        MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                        MOVB    #312,@(SP)      ;WRITE ERROR NUMBER
                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                        NOP
                                22$:

                                ;LOOK FOR "UNS" OR "DTE" OR "WLE" IN ERROR REGISTER #1
                                        BIT     #UNS!DTE!WLE,RMER1I
                                        BEQ     27$             ;NO BITS SET
                                ;REPORT "UNS" ERROR IF "DVC" = 0
```

```
                                                        BIT     #UNS,RMER1I     ;IS "UNS" SET??
                                                        BEQ     23$             ;NO!!
                                                        BIT     #DVC,RMER2I     ;WAS "UNS" CAUSED BY "DVC"??
                                                        BNE     23$             ;YES!!
                                                        MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                                        BIC     #UNS,$GDDAT
                                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                                        ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                        MOVB    #313,@(SP)      ;WRITE ERROR NUMBER
                                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                        SUB     #10,(SP)        ;RESTORE SP TO NO ERROR
                                                23$:

                                                ;REPORT ANY DRIVE TIMING ERROR, I.E., "DTE" = 1
                                                        BIT     #DTE,RMER1I     ;IS DTE SET??
                                                        BEQ     24$             ;NO!!
                                                        MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                                        BIC     #DTE,$GDDAT
                                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                                        MOVB    #314,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                                24$:

                                                ;REPORT AN ERROR IF WRITE LOCK ERROR IS SET.  SEE IF DRIVE IS NOT
                                                ;WRITE PROTECTED, OR IF FUNCTION WAS NOT A WRITE
                                                        BIT     #WLE,RMER1I     ;WAS "WLE" SET??
                                                        BEQ     27$             ;NO!!
                                                        MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                                        MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                                        BIS     #WLE,$GDDAT
                                                        ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                        MOVB    #315,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                                        BIT     #WRL,RMDSI      ;WAS DRIVE WRITE PROTECTED??
                                                        BEQ     25$             ;NO!!
                                                        BIT     #BIT3,RMCS10    ;WAS COMMAND A WRITE??
                                                        BEQ     26$             ;YES!!
                                                25$:    MOVB    #316,@(SP)      ;CHANGE ERROR NUMBER
                                                        BIC     #WLE,$GDDAT
                                                26$:    SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                        JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR

                                                27$:

                                                ;OMIT DATA ERROR CHECKS IF ANY PREVIOUS ERRORS HAVE BEEN DETECTED
                                                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
                                                        TSTB    @(SP)           ;WAS ERROR DETECTED??
                                                        BEQ     28$             ;NO - DO DATA CHECKS
                                                        SUB     #4,(SP)         ;RESTORE SP
                                                        JMP     42$             ;SKIP DATA CHECKS
                                                28$:    SUB     #4,(SP)         ;RESTORE SP

                                                ;CHECK HEADER ERRORS IF FUNCTION WAS NOT WRITE HEADER AND DATA, AND
```

```
                                        ;IF HEADER COMPARE IS NOT INHIBITED
053646  013737  001412  055230            MOV     RMCS10,50$      ;STRIP AND STORE FUNCTION CODE
053654  042737  177700  055230            BIC     #^CFNCMSK,50$
053662  022737  000063  055230            CMP     #WH!GO,50$      ;WAS FUNCTION WRITE HEADER & DATA??
053670  001512                            BEQ     31$             ;YES - SKIP HEADER CHECKS
053672  032737  002000  001370            BIT     #HCI,RMOFI      ;WAS HCI SET??
053700  001106                            BNE     31$             ;YES - SKIP HEADER CHECKS

                                        ;SEE IF ANY HEADER ERRORS ARE SET, I.E., "FER" OR "HCRC" OR "HCE"
053702  032737  000620  001352            BIT     #HCRC!FER!HCE,RMER1I
053710  001533                            BEQ     33$             ;NO ERRORS SET

                                        ;REPORT HEADER CRC ERROR IF SET
053712  032737  000400  001352            BIT     #HCRC,RMER1I    ;WAS HCRC SET??
053720  001422                            BEQ     29$             ;NO!!
053722  013737  001352  001140            MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
053730  042737  000400  001140            BIC     #HCRC,$GDDAT
053736  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
053744  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO USERS ERROR
053750  112776  000317  000000            MOVB    #317,@(SP)      ;WRITE ERROR NUMBER
053756  162716  000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
053762  004736                            JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
053764  000501                            BR      32$
053766                                  29$:

                                        ;REPORT FORMAT ERROR IF SET
053766  032737  000020  001352            BIT     #FER,RMER1I     ;WAS "FER" SET??
053774  001422                            BEQ     30$             ;NO!!
053776  013737  001352  001140            MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
054004  042737  000020  001140            BIC     #FER,$GDDAT
054012  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
054020  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO USERS ERROR
054024  112776  000320  000000            MOVB    #320,@(SP)      ;WRITE ERROR NUMBER
054032  162716  000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
054036  004736                            JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
054040  000453                            BR      32$
054042                                  30$:

                                        ;REPORT HEADER COMPARE ERROR IF SET
054042  032737  000200  001352            BIT     #HCE,RMER1I     ;WAS "HCE" SET??
054050  001453                            BEQ     33$             ;NO!!
054052  013737  001352  001140            MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
054060  042737  000200  001140            BIC     #HCE,$GDDAT
054066  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
054074  062716  000004                    ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
054100  112776  000321  000000            MOVB    #321,@(SP)      ;WRITE ERROR NUMBER
054106  162716  000002                    SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
054112  004736                            JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
054114  000425                            BR      32$
                                        ;THERE SHOULD BE NO HEADER ERRORS BECAUSE
                                        ;       .COMMAND WAS WRITE HEADER AND DATA, OR
                                        ;       .HEADER COMPARE INHIBIT WAS SET
054116  032737  000620  001352  31$:     BIT     #HCE!FER!HCRC,RMER1I
054124  001425                            BEQ     33$             ;NO ERRORS WERE SET
054126  013737  001352  001140            MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
054134  042737  000620  001140            BIC     #HCE!FER!HCRC,$GDDAT
054142  013737  001352  001142            MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
```

```
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                                MOVB    #322,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                        32$:    SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                                JMP     42$             ;OMIT FURTHER DATA CHECKS

                                        33$:

                                        ;IF COMMAND WAS A WRITE COMMAND, GO DO WRITE ERROR CHECKS, OTHERWISE
                                        ;DO READ ERROR CHECKS
                                                BIT     #BIT3,50$       ;WAS THIS A WRITE COMMAND?
                                                BNE     34$             ;NO!!
                                                JMP     39$             ;GO DO WRITE STATUS CHECK
                                        34$:

                                        ;REPORT DATA CHECK IF SET
                                                BIT     #DCK,RMER1I     ;DATA CHECK ERROR??
                                                BEQ     37$             ;NO!!
                                                MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                                BIC     #DCK,$GDDAT
                                                MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
                                                MOVB    #323,@(SP)      ;WRITE ERROR NUMBER
                                                BIT     #ECI,RMOFI      ;WAS ECC CORRECTION DISABLED??
                                                BNE     36$             ;YES!!
                                                MOVB    #324,@(SP)      ;CHANGE TO RECOVERABLE ERROR
                                                BIT     #ECH,RMER1I     ;IS ERROR RECOVERABLE??
                                                BNE     35$             ;NO !!
                                        ;DO NOT REPORT RECOVERABLE ERROR IF READ COMMAND
                                                BIT     #BIT4,50$       ;WAS THIS A READ COMMAND ??
                                                BEQ     36$             ;NO !!
                                                SUB     #4,(SP)         ;RESTORE SP
                                                BR      37$             ;SKIP ERROR - DATA WILL BE CORRECTED
                                        35$:    MOVB    #325,@(SP)      ;CHANGE TO NON RECOVERABLE
                                        36$:    SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;RESTORE SP TO NO ERROR

                                        37$:

                                        ;REPORT DATA BUS PARITY ERROR IF SET, I.E., MDPE = 1
                                                BIT     #MDPE,RMCS2I    ;PARITY ERROR SET??
                                                BEQ     38$             ;NO!!
                                                MOV     RMCS2I,$GDDAT   ;EXPECTED STATUS
                                                BIC     #MDPE,$GDDAT
                                                MOV     RMCS2I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
                                                MOVB    #326,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        38$:    JMP     42$             ;SKIP WRITE STATUS CHECK

                                        39$:

                                        ;TEST TO SEE THAT OFFSET MODE WAS RESET; REPORT ERROR IF "OM" = 1
```

```
                                                BIT     #OM,RMDSI       ;IS OFFSET ON??
                                                BEQ     40$             ;NO
                                                MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
                                                BIC     #OM,$GDDAT
                                                MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                                MOVB    #327,@(SP)      ;WRITE ERROR NUMBER IN CALL
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        40$:

                                        ;TEST FOR DATA BUS PARITY ERROR; REPORT ERROR IF "DPE" = 1
                                                BIT     #DPE,RMER2I     ;DATA PARITY ERROR??
                                                BEQ     41$             ;NO!!
                                                MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
                                                BIC     #DPE,$GDDAT
                                                MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
                                                MOVB    #330,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        41$:

                                        ;TEST FOR WRITE CLOCK FAILURE; REPORT ERROR IF  "WCF" = 1
                                                BIT     #WCF,RMER1I     ;IS "WCF" SET??
                                                BEQ     42$             ;NO!!
                                                MOV     RMER1I,$GDDAT   ;EXPECTED STATUS
                                                BIC     #WCF,$GDDAT
                                                MOV     RMER1I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #331,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        42$:

                                        ;REPORT "DATA LATE" ERROR IF "DLT" = 1
                                                BIT     #DLT,RMCS2I     ;IS "DLT" SET??
                                                BEQ     43$             ;NO!!
                                                MOV     RMCS2I,$GDDAT   ;EXPECTED STATUS
                                                BIC     #DLT,$GDDAT
                                                MOV     RMCS2I,$BDDAT   ;RECEIVED STATUS
                                                ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
                                                MOVB    #332,@(SP)      ;WRITE ERROR NUMBER
                                                SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
                                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
                                                SUB     #10,(SP)        ;MOVE SP TO NO ERROR
                                        43$:
                                        ;LOOK FOR UNEXPECTED CHANGES IN DRIVE STATUS
                                                MOV     RMDSI,-(SP)     ;STACK DRIVE STATUS
                                                BIC     #^C<PIP!MOL!VV>,(SP) ;CLEAR DONT CARES
                                                CMP     #MOL!VV,(SP)+   ;IS DRIVE STATUS OK??
                                                BEQ     46$             ;YES!!

                                        ;REPORT ERROR IF POSITIONING IN PROGRESS AND NO SEEK INCOMPLETE ERROR,
```

```
                                        ;I.E, PIP = 1 AND SKI = 0
055734  032737  020000  001350                BIT     #PIP,RMDSI      ;IS "PIP" SET??
055742  001430                                BEQ     44$             ;NO!!
055744  032737  040000  001400                BIT     #SKI,RMER2I     ;WAS "SKI" ERROR REPORTED??
055752  001024                                BNE     44$             ;YES-DONT REPORT PIP
055754  013737  001350  001140                MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
055762  042737  020000  001140                BIC     #PIP,$GDDAT
055770  013737  001350  001142                MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
055776  062716  000004                        ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
056002  112776  000333  000000                MOVB    #333,@(SP)      ;WRITE ERROR NUMBER
056010  162716  000002                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
056014  004736                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
056016  162716  000010                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR
056022  000240                                NOP
055024                                  44$:

                                        ;REPORT ERROR IF MEDIUM IS NOT ON LINE AND OPI ERROR WAS NOT
                                        ;REPORTED, I.E.. MOL = OPI = 0
055024  032737  010000  001350                BIT     #MOL,RMDSI      ;IS MEDIUM ON LINE??
055032  001027                                BNE     45$             ;YES!!
055034  032737  020000  001352                BIT     #OPI,RMER1I     ;WAS OPI ERROR REPORTED??
055042  001023                                BNE     45$             ;YES!!
055044  013737  001350  001140                MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
055052  052737  010000  001140                BIS     #MOL,$GDDAT
055060  013737  001350  001142                MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
055066  062716  000004                        ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR
055072  112776  000334  000000                MOVB    #334,@(SP)      ;WRITE ERROR NUMBER
055100  162716  000002                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
055104  004736                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
055106  162716  000010                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR
055112                                  45$:

                                        ;REPORT ERROR IF VOLUME IS NOT VALID AND "IVC" ERROR WAS NOT
                                        ;REPORTED, I.E., VV = IVC = 0
055112  032737  000100  001350                BIT     #VV,RMDSI       ;IS VOLUME VALID??
055120  001027                                BNE     46$             ;YES!!
055122  032737  010000  001400                BIT     #IVC,RMER2I     ;WAS IVC ERROR REPORTED??
055130  001033                                BNE     47$             ;YES!!
055132  013737  001350  001140                MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
055140  052737  000100  001140                BIS     #VV,$GDDAT
055146  013737  001350  001142                MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
055154  062716  000004                        ADD     #4,(SP)         ;MOVE SP TO USERS ERROR CALL
055160  112776  000335  000000                MOVB    #335,@(SP)      ;WRITE ERROR NUMBER
055166  162716  000002                        SUB     #2,(SP)         ;MOVE SP TO RETURN IF ERROR
055172  004736                                JSR     PC,@(SP)+       ;REPORT ERROR AND RETURN
055174  162716  000010                        SUB     #10,(SP)        ;MOVE SP TO NO ERROR
055200                                  46$:

                                        ;AUGMENT THE RETURN ADDRESS IF ANY ERROR WAS FOUND
055200  062716  000004                        ADD     #4,(SP)         ;MOVE SP TO ERROR CALL
055204  105776  000000                        TSTB    @(SP)           ;ANY ERROR??
055210  001403                                BEQ     47$             ;NO!!
055212  062716  000004                        ADD     #4,(SP)         ;YES - MOVE SP TO ERROR RETURN
055216  000402                                BR      48$
055220  162716  000004                47$:    SUB     #4,(SP)         ;MOVE SP TO NO ERROR RETURN

055224  000207                        48$:    RTS     PC              ;RETURN TO USER
```

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    571
    572 0[illegible]26  000000          49$:    .WORD               ;ERROR FLAGS
    573 0[illegible]230  000000         50$:    .WORD               ;TEMPORARY STORAGE
```

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                                .SBTTL  STATIC DRIVE STATUS CHECK SUBROUTINE

                                ;THIS SUBROUTINE LOOKS FOR UNEXPECTED CHANGES IN DRIVE
                                ;STATUS, SUCH AS THE DRIVE LOSING VOLUME VALID.  THE SUBROUTINE
                                ;CAN BE USED BY HOUSEKEEPING AND OTHER COMMANDS DURING WHICH THERE
                                ;SHOULD NOT BE ANY DRIVE ERRORS OR CHANGES IN STATE.

                                ;THE FOLLOWING CONDITIONS ARE TESTED AND REPORTED AS ERRORS
                                ;IF TRUE:

                                ;       .MOL = 0, INDICATES DRIVE WENT OFFLINE, NOTE
                                ;THAT MOL IS ASSUMED TO HAVE BEEN SET
                                ;       .VV = 0, INDICATES THE DRIVE LOST VOLUME VALID
                                ;       .PIP = 1, INDICATES THAT THE DRIVE IS OFF CYLINDER
                                ;       .SKI = 1, INDICATES THE DRIVE HAS AN UNEXPECTED SKI ERROR
                                ;       .DVC = 1, INDICATES AN UNEXPECTED DEVICE FAULT

                                ;THE SUBROUTINE IS CALLED AFTER STORING STATUS IN THE GET BUFFER.

                                ;(1)    JSR     PC,STCDRVSTS
                                ;       BR      ???             RETURN HERE IF NO ERROR
                                ;       NOP                     RETURN HERE TO REPORT AN ERROR
                                ;       ERROR                   ERROR NUMBER DEFINED BY SUB
                                ;       JSR     PC,@(SP)+       GO BACK TO SUB FOR MORE ERROR CHECKS
                                ;       ???                     RETURN HERE IF NO MORE ERRORS

055232                          STCDRVSTS:

                                ;CLEAR USER'S ERROR CALL
055232  062716  000004                  ADD     #4,(SP) ;MOVE SP TO USER'S ERROR CALL
055236  105076  000000                  CLRB    @(SP)           ;CLEAR ERROR NUMBER
055242  162716  000004                  SUB     #4,(SP)         ;MOVE SP BACK TO NO ERROR RETURN
                                ;SEE IF "MOL" = "VV" = 1, AND "PIP" = 0
055246  013746  001350                  MOV     RMDSI,-(SP)     ;PUT DRIVE STATUS ON STACK
055252  042716  147677                  BIC     #^C<PIP!MOL!VV>,(SP)
055256  022726  010100                  CMP     #MOL!VV,(SP)+   ;ARE MOL,VV AND PIP O.K.??
055262  001524                          BEQ     3$              ;YES!!

                                ;REPORT AN ERROR IF MOL = 0 AND "OPI" = 0
055264  032737  010000  001350          BIT     #MOL,RMDSI      ;IS MOL ON ??
055272  001030                          BNE     1$              ;YES!!
055274  032737  020000  001352          BIT     #OPI,RMER1I     ;WAS "OPI" SET??
055302  001024                          BNE     1$              ;YES-DONT REPORT "MOL" = 0
055304  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
055312  052737  010000  001140          BIS     #MOL,$GDDAT
055320  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
055326  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
055332  112776  000207  000000          MOVB    #207,@(SP)      ;WRITE ERROR NUMBER IN CALL
055340  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
055344  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
055346  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR RETURN
055352  000240                          NOP
055354                          1$:

                                ;REPORT AN ERROR IF VOLUME VALID IS NOW ZERO AND "IVC" = 0
055354  032737  000100  001350          BIT     #VV,RMDSI       ;IS "VV" = 0??
055362  001030                          BNE     2$              ;NO!!
```

```
     58 055364  032737  010000  001400          BIT     #IVC,RMER2I     ;WAS "IVC" SET??
     59 055372  001024                          BNE     2$              ;YES-DONT REPORT "VV" = 0
     60 055374  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
     61 055402  052737  000100  001350          BIS     #VV,RMDSI
     62 055410  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
     63 055416  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
     64 055422  112776  000210  000000          MOVB    #210,@(SP)      ;WRITE ERROR NUMBER IN CALL
     65 055430  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
     66 055434  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
     67 055436  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
     68 055442  000240                          NOP
     69 055444                          2$:
     70
     71                                 ;REPORT AN ERROR IF DRIVE IS OFF CYLINDER AND "SKI" = 0
     72 055444  032737  020000  001350          BIT     #PIP,RMDSI      ;IS DRIVE OFF CYLINDER??
     73 055452  001430                          BEQ     3$              ;NO!!
     74 055454  032737  040000  001400          BIT     #SKI,RMER2I     ;WAS "SKI" SET??
     75 055462  001024                          BNE     3$              ;YES-DONT REPORT "PIP" = 1
     76 055464  013737  001350  001140          MOV     RMDSI,$GDDAT    ;EXPECTED STATUS
     77 055472  042737  020000  001140          BIC     #PIP,$GDDAT
     78 055500  013737  001350  001142          MOV     RMDSI,$BDDAT    ;RECEIVED STATUS
     79 055506  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
     80 055512  112776  000211  000000          MOVB    #211,@(SP)      ;WRITE ERROR NUMBER IN USER'S CALL
     81 055520  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
     82 055524  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
     83 055526  162716  000010                  SUB     #10,(SP)        ;MOVE SP TO NO ERROR RETURN
     84 055532  000240                          NOP
     85 055534                          3$:
     86
     87                                 ;SEE IF "SKI" = "DVC" = 0
     88 055534  013746  001400                  MOV     RMER2I,-(SP)    ;PUT ERROR REG 2 ON STACK
     89 055540  042726  137577                  BIC     #^C<SKI!DVC>,(SP)+
     90 055544  001460                          BEQ     6$              ;BRANCH IF NO ERROR
     91 055546                          4$:
     92
     93                                 ;REPORT AN ERROR IF THERE IS A DEVICE FAULT
     94 055546  032737  000200  001400          BIT     #DVC,RMER2I     ;ANY DEVICE FAULT??
     95 055554  001424                          BEQ     5$              ;NO!!
     96 055556  013737  001400  001140          MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
     97 055564  042737  000200  001140          BIC     #DVC,$GDDAT
     98 055572  013737  001400  001142          MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
     99 055600  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S CALL
    100 055604  112776  000212  000000          MOVB    #212,@(SP)      ;WRITE NUMBER OF ERROR IN CALL
    101 055612  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    102 055616  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
    103 055620  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
    104 055624  000240                          NOP
    105 055626                          5$:
    106
    107                                 ;REPORT AN ERROR IF "SKI" = 1
    108 055626  032737  040000  001400          BIT     #SKI,RMER2I     ;IS THERE A SEEK INCOMPLETE ERROR
    109 055634  001424                          BEQ     6$              ;NO!!
    110 055636  013737  001400  001140          MOV     RMER2I,$GDDAT   ;EXPECTED STATUS
    111 055644  042737  040000  001140          BIC     #SKI,$GDDAT
    112 055652  013737  001400  001142          MOV     RMER2I,$BDDAT   ;RECEIVED STATUS
    113 055660  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    114 055664  112776  000213  000000          MOVB    #213,@(SP)      ;WRITE ERROR NUMBER IN USER'S ERROR CALL
```

STATIC DRIVE STATUS CHECK SUBROUTINE

```
    115 055672  162716  000002                  SUB     #2,(SP)         ;MOVE SP TO RETURN FOR ERROR
    116 055676  004736                          JSR     PC,@(SP)+       ;REPORT ERROR VIA USER
    117 055700  162716  000010                  SUB     #10,(SP)        ;MOVE SP BACK TO NO ERROR
    118 055704  000240                          NOP
    119 055706                          6$:
    120
    121                                 ;AUGMENT THE RETURN ADDRESS IF ANY ERROR WAS DETECTED
    122 055706  062716  000004                  ADD     #4,(SP)         ;MOVE SP TO USER'S ERROR CALL
    123 055712  105776  000000                  TSTB    @(SP)           ;WAS AN ERROR DETECTED??
    124 055716  001403                          BEQ     7$              ;NO!!
    125 055720  062716  000004                  ADD     #4,(SP)         ;YES - MOVE SP TO USER'S ERROR RETURN
    126 055724  000402                          BR      8$
    127 055726  162716  000004          7$:     SUB     #4,(SP)         ;NO - MOVE SP TO NO ERROR RETURN
    128 055732  000240                  8$:     NOP
    129 055734  000207                          RTS     PC              ;RETURN TO USER
```

```
      1                               .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

                                      ;;*****************************************************************
                                      ;*SAVE R0-R5
                                      ;*CALL:
                                      ;*      SAVREG
                                      ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                      ;*
                                      ;*TOP---(+16)
                                      ;* +2---(+18)
                                      ;* +4---R5
                                      ;* +6---R4
                                      ;* +8---R3
                                      ;*+10---R2
                                      ;*+12---R1
                                      ;*+14---R0

 055736                               $SAVREG:
 055736  010046                               MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 055740  010146                               MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 055742  010246                               MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 055744  010346                               MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 055746  010446                               MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 055750  010546                               MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 055752  016646  000022                       MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
 055756  016646  000022                       MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
 055762  016646  000022                       MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
 055766  016646  000022                       MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
 055772  000002                               RTI

                                      ;*RESTORE R0-R5
                                      ;*CALL:
                                      ;*      RESREG
 055774                               $RESREG:
 055774  012666  000022                       MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
 056000  012666  000022                       MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
 056004  012666  000022                       MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
 056010  012666  000022                       MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
 056014  012605                               MOV     (SP)+,R5        ;;POP STACK INTO R5
 056016  012604                               MOV     (SP)+,R4        ;;POP STACK INTO R4
 056020  012603                               MOV     (SP)+,R3        ;;POP STACK INTO R3
 056022  012602                               MOV     (SP)+,R2        ;;POP STACK INTO R2
 056024  012601                               MOV     (SP)+,R1        ;;POP STACK INTO R1
 056026  012600                               MOV     (SP)+,R0        ;;POP STACK INTO R0
 056030  000002                               RTI
```

BINARY TO ASCII AND TYPE ROUTINE

```
                                .SBTTL  BINARY TO ASCII AND TYPE ROUTINE

                                ;;**********************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
                                ;*BINARY-ASCII NUMBER AND TYPE IT.
                                ;*CALL:
                                ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
                                ;*      TYPBN                   ;;TYPE IT

056032  010146                  $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
056034  016601  000006                  MOV     6(SP),R1        ;;GET THE INPUT NUMBER
056040  000261                          SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
056042  112737  000060  056104  1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
056050  006101                          ROL     R1              ;;GET THIS BIT
056052  001406                          BEQ     2$              ;;DONE?
056054  105537  056104                  ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
056060  104401  056104                  TYPE    ,$BIN           ;;GO TYPE THIS BIT
056064  000241                          CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
056066  000765                          BR      1$              ;;GO DO THE NEXT BIT
056070  012601                  2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
056072  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
056100  012616                          MOV     (SP)+,(SP)
056102  000002                          RTI                     ;;RETURN TO USER
056104     000     000          $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
```

```
                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

                                ;;*****************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                                ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                                ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                                ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                                ;*REPLACED WITH SPACES.
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                                ;*      TYPDS                   ;;GO TO THE ROUTINE

056106                          $TYPDS:
056106  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
056110  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
056112  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
056114  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
056116  010546                         MOV     R5,-(SP)        ;;PUSH R5 ON STACK
056120  012746  020200                 MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
056124  016605  000020                 MOV     20(SP),R5       ;;GET THE INPUT NUMBER
056130  100004                         BPL     1$              ;;BR IF INPUT IS POS.
056132  005405                         NEG     R5              ;;MAKE THE BINARY NUMBER POS.
056134  112766  000055  000001         MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
056142  005000                 1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
056144  012703  056322                 MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
056150  112723  000040                 MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
056154  005002                 2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
056156  016001  056312                 MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
056162  160105                 3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
056164  002402                         BLT     4$              ;;BR IF DONE
056166  005202                         INC     R2              ;;INCREASE THE BCD DIGIT BY 1
056170  000774                         BR      3$
056172  060105                 4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
056174  005702                         TST     R2              ;;CHECK IF BCD DIGIT=0
056176  001002                         BNE     5$              ;;FALL THROUGH IF 0
056200  105716                         TSTB    (SP)            ;;STILL DOING LEADING 0'S?
056202  100407                         BMI     7$              ;;BR IF YES
056204  106316                 5$:     ASLB    (SP)            ;;MSD?
056206  103003                         BCC     6$              ;;BR IF NO
056210  116663  000001  177777         MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
056216  052702  000060         6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
056222  052702  000040         7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
056226  110223                         MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
056230  005720                         TST     (R0)+           ;;JUST INCREMENTING
056232  020027  000010                 CMP     R0,#10          ;;CHECK THE TABLE INDEX
056236  002746                         BLT     2$              ;;GO DO THE NEXT DIGIT
056240  003002                         BGT     8$              ;;GO TO EXIT
056242  010502                         MOV     R5,R2           ;;GET THE LSD
056244  000764                         BR      6$              ;;GO CHANGE TO ASCII
056246  105726                 8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
056250  100003                         BPL     9$              ;;BR IF NO
056252  116663  177777  177776         MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
056260  105013                 9$:     CLRB    (R3)            ;;SET THE TERMINATOR
056262  012605                         MOV     (SP)+,R5        ;;POP STACK INTO R5
056264  012603                         MOV     (SP)+,R3        ;;POP STACK INTO R3
056266  012602                         MOV     (SP)+,R2        ;;POP STACK INTO R2
056270  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
```

CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

```
056272  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
056274  104401  056322                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
056300  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
056306  012616                          MOV     (SP)+,(SP)
056310  000002                          RTI                     ;;RETURN TO USER
056312  023420                  $DTBL:  10000.
056314  001750                          1000.
056316  000144                          100.
056320  000012                          10.
056322                          $DBLK:  .BLKW   4
```

```
                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

                                ;;*****************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                ;*      .BYTE   M               ;;M=1 OR 0
                                ;*                                      ;;1=TYPE LEADING ZEROS
                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$TYPOS OR $TYPOC
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPON                   ;;CALL FOR TYPEOUT
                                ;*
                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOC                   ;;CALL FOR TYPEOUT

056332  017646  000000        $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
056336  116637  000001 056555          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
056344  112637  056557                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
056350  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
056354  000406                          BR      $TYPON
056356  112737  000001 056555  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
056364  112737  000006 056557          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
056372  112737  000005 056554  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
056400  010346                          MOV     R3,-(SP)        ;;SAVE R3
056402  010446                          MOV     R4,-(SP)        ;;SAVE R4
056404  010546                          MOV     R5,-(SP)        ;;SAVE R5
056406  113704  056557                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
056412  005404                          NEG     R4
056414  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
056420  110437  056556                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
056424  113704  056555                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
056430  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
056434  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
056436  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
056440  000404                          BR      3$              ;;GO DO MSB
056442  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
056444  006105                          ROL     R5
056446  006105                          ROL     R5
056450  010503                          MOV     R5,R3
056452  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
056454  105337  056556                  DECB    $OMODE          ;;TYPE THIS DIGIT?
056460  100016                          BPL     7$              ;;BR IF NO
056462  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
056466  001002                          BNE     4$              ;;TEST FOR 0
056470  005704                          TST     R4              ;;SUPPRESS THIS 0?
056472  001403                          BEQ     5$              ;;BR IF YES
056474  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
```

```
056476  052703  000060              BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
056502  052703  000040      5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
056506  110337  056552              MOVB    R3,8$           ;;SAVE FOR TYPING
056512  104401  056552              TYPE    ,8$             ;;GO TYPE THIS DIGIT
056516  105337  056554      7$:     DECB    $OCNT           ;;COUNT BY 1
056522  003347                      BGT     2$              ;;BR IF MORE TO DO
056524  002402                      BLT     6$              ;;BR IF DONE
056526  005204                      INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
056530  000744                      BR      2$              ;;GO DO THE LAST DIGIT
056532  012605              6$:     MOV     (SP)+,R5        ;;RESTORE R5
056534  012604                      MOV     (SP)+,R4        ;;RESTORE R4
056536  012603                      MOV     (SP)+,R3        ;;RESTORE R3
056540  016666  000002  000004      MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
056546  012616                      MOV     (SP)+,(SP)
056550  000002                      RTI                     ;;RETURN
056552     000              8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
056553     000                      .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
056554     000              $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
056555     000              $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
056556  000000              $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
                                .SBTTL  TYPE ROUTINE

                                ;;*****************************************************************
                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                ;*NOTE1:         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                ;*NOTE2:         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                ;*NOTE3:         $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                ;*
                                ;*CALL:
                                ;*1) USING A TRAP INSTRUCTION
                                ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                ;*OR
                                ;*      TYPE
                                ;*      MESADR
                                ;*

056560  105737  001173          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
056564  100002                          BPL     1$              ;;BR IF YES
056566  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
056570  000430                          BR      3$              ;;LEAVE
056572  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
056574  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
056600  122737  000001  001242          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
056606  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
056610  132737  000100  001243          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
056616  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
056620  010037  056630                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
056624  004737  063206                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
056630  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
056632  132737  000040  001243  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
056640  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
056642  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
056644  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
056646  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
056650  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
056652  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
056656  000002                          RTI                     ;;RETURN
056660  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
056664  001430                          BEQ     8$
056666  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
056672  001006                          BNE     5$
056674  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
056676  104401                          TYPE                    ;;TYPE A CR AND LF
056700  001217                          $CRLF
056702  105037  057110                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
056706  000755                          BR      2$              ;;GET NEXT CHARACTER
056710  004737  056772          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
056714  123726  001172          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
056720  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
056722  013746  001170                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
056726  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
056732  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
056734  004737  056772                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
056740  105337  057110                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
056744  000770                          BR      7$              ;;LOOP
```

```
                                        ;HORIZONTAL TAB PROCESSOR

056746  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
056752  004737  056772          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
056756  132737  000007  057110          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
056764  001372                          BNE     9$              ;;TAB STOP
056766  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
056770  000724                          BR      2$              ;;GET NEXT CHARACTER
056772                          $TYPEC:
056772  105777  122162                  TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?
056776  100022                          BPL     10$             ;;BR IF NOT
057000  017746  122156                  MOV     @$TKB,-(SP)     ;;GET CHAR
057004  042716  177600                  BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS
057010  122716  000023                  CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF
057014  001012                          BNE     102$            ;;BR IF NOT
057016                          101$:
057016  105777  122136                  TSTB    @$TKS           ;;WAIT FOR CHAR
057022  100375                          BPL     101$
057024  117716  122132                  MOVB    @$TKB,(SP)      ;;GET CHAR
057030  042716  177600                  BIC     #177600,(SP)    ;;STRIP IT
057034  122716  000021                  CMPB    #$XON,(SP)      ;;WAS IT XON?
057040  001366                          BNE     101$            ;;BR IF NOT
057042                          102$:
057042  005726                          TST     (SP)+           ;;FIX STACK
057044                          10$:
057044  105777  122114                  TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
057050  100375                          BPL     10$
057052  116677  000002  122106          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
057060  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
057066  001003                          BNE     1$              ;;BRANCH IF NO
057070  105037  057110                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
057074  000406                          BR      $TYPEX          ;;EXIT
057076  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
057104  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
057106  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
057110  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
057112  000207          $TYPEX: RTS     PC
```

SCOPE HANDLER ROUTINE

```
                                .SBTTL  SCOPE HANDLER ROUTINE

                                ;;*********************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW11=1         INHIBIT ITERATIONS
                                ;*SW09=1         LOOP ON ERROR
                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                ;*CALL
                                ;*      SCOPE           ;;SCOPE=IOT

 057114                         $SCOPE:
 057114  104410                         CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
 057116  004737  057662                 JSR     PC,STOP
 057122  032777  040000  122024 1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
 057130  001402                         BEQ     9$              ;;NO IF SW14=0
 057132  000137  057562                 JMP     $OVER           ;;JUMP OVER SCOPE ROUTINE
 057136                         9$:
                                ;#####START OF CODE FOR THE XOR TESTER#####
 057136  000416                 $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
 057140  013746  000004                 MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
 057144  012737  057164  000004         MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
 057152  005737  177060                 TST     @#177060        ;;TIME OUT ON XOR?
 057156  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 057162  000561                         BR      $SVLAD          ;;GO TO THE NEXT TEST
 057164  022626                 5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
 057166  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 057172  000521                         BR      7$              ;;LOOP ON THE PRESENT TEST
 057174                         6$:;#####END OF CODE FOR THE XOR TESTER#####
 057174  032777  000400  121752         BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
 057202  001421                         BEQ     2$              ;;BR IF NO
 057204  005046                         CLR     -(SP)           ;;CLEAR A TEMP. LOCATION
 057206  117716  121742                 MOVB    @SWR,(SP)       ;;PICKUP THE DESIRED TEST NUMBER
 057212  001414                         BEQ     8$              ;;BRANCH IF BAD TEST NUMBER IN SWR
 057214  022716  000031                 CMP     #31,(SP)        ;;CHECK THE NUMBER IN THE SWR
 057220  002411                         BLT     8$              ;;BRANCH IF TEST NUMBER IS OUT OF RANGE
 057222  011637  001116                 MOV     (SP),$TSTNM     ;;UPDATE THE TEST NUMBER
 057226  005316                         DEC     (SP)            ;;BACKUP BY ONE
 057230  006316                         ASL     (SP)            ;;SCALE THE TEST NUMBER AS AN INDEX
 057232  062716  057600                 ADD     #$SWOBTBL,(SP)  ;;FORM THE ADDRESS OF TEST POINTER
 057236  013637  001122                 MOV     @(SP)+,$LPADR   ;;SET LOOP ADDRESS TO DESIRED TEST
 057242  000547                         BR      $OVER           ;;GO LOOP ON THE TEST
 057244  005726                 8$:     TST     (SP)+           ;;CLEAN THE BAD TEST NUMBER OFF OF THE STACK
 057246  105737  001117         2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
 057252  001502                         BEQ     3$              ;;BR IF NO
 057254  022737  177777  060300         CMP     #-1,CPSAVE      ;;SEE IF TIMEOUT WAS PREVIOUSLY RECORDED
 057262  001455                         BEQ     2003$           ;;KICK AROUND ROUTINE IF SO
 057264  013746  000004                 MOV     ERRVEC,-(SP)    ;;SAVE CONTENTS OF ERROR VECTOR
 057270  012737  057306  000004         MOV     #2000$,ERRVEC   ;;SETUP 'TRAP' RETURN ADDRESS
 057276  013737  177766  060300         MOV     177766,CPSAVE   ;;MOVE CPU ERROR REGISTER TO CPSAVE FOR TEST
 057304  000406                         BR      2001$
 057306  012737  177777  060300 2000$:  MOV     #-1,CPSAVE      ;;SET CPU ERROR REGISTER TIMEOUT INDICATOR
 057314  012716  057322                 MOV     #2001$,(SP)     ;;SETUP RETURN ADDRESS
```

```
057320  000002                          RTI
057322  012637  000004          2001$:  MOV     (SP)+,ERRVEC    ;;RESTORE CONTENTS OF ERROR VECTOR

057326  022737  177777  060300  2002$:  CMP     #-1,CPSAVE      ;;SEE IF CPSAVE HAS CPU ERR REG TIMEOUT INDICATION
057334  001430                          BEQ     2003$           ;;BRANCH IF SO
057336  032737  000001  060300          BIT     #BIT00,CPSAVE   ;;SEE IF THE POWER MONITOR BIT IS ON
057344  001424                          BEQ     2003$           ;;BRANCH TO CONTINUE ROUTINE IF CLEAR
057346  042737  000001  177766          BIC     #BIT00,177766   ;;CLEAR THE BIT FOUND TO BE SET
057354  013746  001154                  MOV     SWR,-(SP)       ;;SAVE SWR ADDRESS
057360  017646  000000                  MOV     @(SP),-(SP)     ;;SAVE SWR VALUE
057364  012737  000176  001154          MOV     #176,SWR        ;;GET SOFTWARE SWR ADDRESS
057372  011677  121556                  MOV     (SP),@SWR       ;;GET CURRENT SWR VALUE
057376  042777  001000  121550          BIC     #BIT09,@SWR     ;;DON'T ALLOW LOOP ON ERROR ON THIS ERROR
057404  104177                          EMT     177             ;;CALL SPECIAL POWER FAIL BIT ERROR CALL
057406  012676  000000                  MOV     (SP)+,@(SP)     ;;RESTORE SWR TO ORIGINAL VALUE
057412  012637  001154                  MOV     (SP)+,SWR       ;;RESTORE SWR ADDRESS
057416                          2003$:
057416  123737  001131  001117          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
057424  101015                          BHI     3$              ;;BR IF NO
057426  032777  001000  121520          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
057434  001404                          BEQ     4$              ;;BR IF NO
057436  013737  001124  001122  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
057444  000446                          BR      $OVER
057446  105037  001117          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
057452  005037  001206                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
057456  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
057460  032777  004000  121466  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
057466  001011                          BNE     1$              ;;BR IF YES
057470  005737  001230                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
057474  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
057476  005237  001120                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
057502  023737  001206  001120          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
057510  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
057512  012737  000001  001120  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
057520  013737  057576  001206          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
057526  105237  001116          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
057532  113737  001116  001226          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
057540  011637  001122                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
057544  011637  001124                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
057550  005037  001210                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
057554  112737  000001  001131          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
057562  013777  001116  121366  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
057570  013716  001122                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
057574  000002                          RTI                     ;;FIXES PS
057576  000005                  $MXCNT: 5.                      ;;MAX. NUMBER OF ITERATIONS
057600                          $SW08TBL:
        000031                  .REPT   $TN-1
057600  007700                          .WORD   TST1+2          ;;STARTING ADDRESS OF TEST 1
057602  010100                          .WORD   TST2+2          ;;STARTING ADDRESS OF TEST 2
057604  011012                          .WORD   TST3+2          ;;STARTING ADDRESS OF TEST 3
057606  011646                          .WORD   TST4+2          ;;STARTING ADDRESS OF TEST 4
057610  012436                          .WORD   TST5+2          ;;STARTING ADDRESS OF TEST 5
057612  013376                          .WORD   TST6+2          ;;STARTING ADDRESS OF TEST 6
057614  014216                          .WORD   TST7+2          ;;STARTING ADDRESS OF TEST 7
057616  015006                          .WORD   TST10+2         ;;STARTING ADDRESS OF TEST 10
057620  015744                          .WORD   TST11+2         ;;STARTING ADDRESS OF TEST 11
057622  016562                          .WORD   TST12+2         ;;STARTING ADDRESS OF TEST 12
```

```
057624  017222                          .WORD   TST13+2         ;;STARTING ADDRESS OF TEST 13
057626  017676                          .WORD   TST14+2         ;;STARTING ADDRESS OF TEST 14
057630  020520                          .WORD   TST15+2         ;;STARTING ADDRESS OF TEST 15
057632  021262                          .WORD   TST16+2         ;;STARTING ADDRESS OF TEST 16
057634  022024                          .WORD   TST17+2         ;;STARTING ADDRESS OF TEST 17
057636  022376                          .WORD   TST20+2         ;;STARTING ADDRESS OF TEST 20
057640  022750                          .WORD   TST21+2         ;;STARTING ADDRESS OF TEST 21
057642  023312                          .WORD   TST22+2         ;;STARTING ADDRESS OF TEST 22
057644  023634                          .WORD   TST23+2         ;;STARTING ADDRESS OF TEST 23
057646  024152                          .WORD   TST24+2         ;;STARTING ADDRESS OF TEST 24
057650  025064                          .WORD   TST25+2         ;;STARTING ADDRESS OF TEST 25
057652  025706                          .WORD   TST26+2         ;;STARTING ADDRESS OF TEST 26
057654  026610                          .WORD   TST27+2         ;;STARTING ADDRESS OF TEST 27
057656  027676                          .WORD   TST30+2         ;;STARTING ADDRESS OF TEST 30
057660  030522                          .WORD   TST31+2         ;;STARTING ADDRESS OF TEST 31
                                ;DROP PRIORITY TO ALLOW CONSOLE INTERRUPT
                                STOP:
057662  012746  000140                  MOV     #PR3,-(SP)      ;;PUT NEW PS ON STACK
057666  012746  057674                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
057672  000002                          RTI                     ;;POP NEW PC AND PS
057674                          64$:
                                ;RAISE PRIORITY TO INHIBIT CONSOLE INTERRUPT
057674  012746  000240                  MOV     #PR5,-(SP)      ;;PUT NEW PS ON STACK
057700  012746  057706                  MOV     #65$,-(SP)      ;;PUT NEW PC ON  STACK
057704  000002                          RTI                     ;;POP NEW PC AND PS
057706                          65$:
057706  000207                          RTS     PC              ;RETURN
```

```
1                                       .SBTTL  ERROR HANDLER ROUTINE

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                        ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                        ;*AND GO TO ERRTYP ON ERROR
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW15=1         HALT ON ERROR
                                        ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                        ;*SW10=1         BELL ON ERROR
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*CALL
                                        ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

057710  105037  060302          $ERROR: CLRB    IBSAVE          ;;CLEAR THE ITEM BYTE SAVE LOCATION
057714  104410                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
057716  105237  001117          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
057722  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
057724  013777  001116  121224          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
057732  032777  002000  121214          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
057740  001402                          BEQ     1$              ;;NO - SKIP
057742  104401  001212                  TYPE    ,$BELL          ;;RING BELL
057746  005237  001126          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
057752  011637  001132                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
057756  162737  000002  001132          SUB     #2,$ERRPC
057764  117737  121142  001130          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
057772  032777  001000  121154          BIT     #BIT09,@SWR     ;;SEE IF LOOP ON ERROR IS SET
060000  001060                          BNE     1004$           ;;BRANCH AROUND ROUTINE IF SO
060002  122737  000177  001130          CMPB    #177,$ITEMB     ;;SEE IF THIS IS THE POWER FAIL CALL
060010  001454                          BEQ     1004$           ;;BRANCH AROUND ROUTINE IF IT IS
060012  105737  060302                  TSTB    IBSAVE          ;;SEE IF THIS IS THE 2ND ERROR CALL IN THIS ROUTINE
060016  001047                          BNE     1003$           ;;BRANCH IF SO
060020  022737  177777  060300          CMP     #-1,CPSAVE      ;;SEE IF CPSAVE HAS CPU ERR REG TIMEOUT INDICATION
060026  001445                          BEQ     1004$           ;;BRANCH IF SO
060030  013746  000004                  MOV     ERRVEC,-(SP)    ;;SAVE CONTENTS OF ERROR VECTOR
060034  012737  060052  000004          MOV     #1000$,ERRVEC   ;;SETUP 'TRAP' RETURN ADDRESS
060042  013737  177766  060300          MOV     177766,CPSAVE   ;;MOVE CPU ERROR REGISTER TO CPSAVE FOR TEST
060050  000406                          BR      1001$
060052  012737  177777  060300  1000$:  MOV     #-1,CPSAVE      ;;SET CPU ERROR REGISTER TIMEOUT INDICATOR
060060  012716  060066                  MOV     #1001$,(SP)     ;;SETUP RETURN ADDRESS
060064  000002                          RTI
060066  012637  000004          1001$:  MOV     (SP)+,ERRVEC    ;;RESTORE CONTENTS OF ERROR VECTOR

060072  022737  177777  060300  1002$:  CMP     #-1,CPSAVE      ;;SEE IF CPSAVE HAS CPU ERR REG TIMEOUT INDICATION
060100  001420                          BEQ     1004$           ;;BRANCH IF SO
060102  032737  000001  060300          BIT     #BIT00,CPSAVE   ;;SEE IF POWER MONITOR BIT IS SET IN CPU ERR REG
060110  001414                          BEQ     1004$           ;;BRANCH IF OK
060112  042737  000001  177766          BIC     #BIT00,177766   ;;CLEAR THE BIT FOUND SET
060120  113737  001130  060302          MOVB    $ITEMB,IBSAVE   ;;MAKE IBSAVE NON-ZERO FOR DUAL ERROR CALL
060126  112737  000177  001130          MOVB    #177,$ITEMB     ;;SET $ITEMB TO SPECIAL POWER FAIL POINTER
060134  000402                          BR      1004$           ;;BRANCH OVER IBSAVE CLEARING

060136  105037  060302          1003$:  CLRB    IBSAVE          ;;CLEAR IBSAVE SO 2ND TIME THROUGH EXITS
060142                          1004$:
060142  032777  020000  121004          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
060150  001004                          BNE     20$             ;;SKIP TYPEOUTS
060152  004737  060304                  JSR     PC,ERRTYP       ;;GO TO USER ERROR ROUTINE
```

ERROR HANDLER ROUTINE

```
060156  104401  001217                  TYPE    ,$CRLF
060162                          20$:
060162  122737  000001  001242          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
060170  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
060172  113737  001130  060204          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
060200  004737  063216                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
060204     000                  21$:    .BYTE   0
060205     000                          .BYTE   0
060206  000777                  22$:    BR      22$             ;;APT ERROR LOOP
060210  105737  060302          2$:     TSTB    IBSAVE          ;;SEE IF IBSAVE IS LOADED
060214  001005                          BNE     3$              ;;BRANCH IF NOT - NO HALT ON PWR MON BIT ERROR
060216  005777  120732                  TST     @SWR            ;;HALT ON ERROR
060222  100002                          BPL     3$              ;;SKIP IF CONTINUE
060224  000000                          HALT                    ;;HALT ON ERROR!
060226  104410                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
060230                          3$:
060230  032777  001000  120716          BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
060236  001402                          BEQ     4$              ;;BR IF NO
060240  013716  001124                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
060244  005737  001210          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
060250  001402                          BEQ     5$              ;;BR IF NONE
060252  013716  001210                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
060256                          5$:
060256  022737  031402  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
060264  001001                          BNE     6$              ;;BRANCH IF NO
060266  000000                          HALT                    ;;YES
060270                          6$:
060270  105737  060302                  TSTB    IBSAVE          ;;SEE IF ITEM BYTE SAVE LOCATION HAS AN ERROR CALL
060274  001210                          BNE     7$              ;;BRANCH BACK TO CALL ORIGINAL ERROR
060276  000002                          RTI                     ;;RETURN
060300  000000          CPSAVE: .WORD   0               ;;LOCATION TO SAVE CPU ERROR REG CONTENTS
060302  000000          IBSAVE: .WORD   0               ;;LOCATION TO SAVE ITEM BYTE
```

ERROR TYPEOUT ROUTINE

```
                                        .SBTTL  ERROR TYPEOUT ROUTINE
                                ;
                                ;*THE ERROR TYPEOUT ROUTINE ASSEMBLES AND PRINTS INFORMATION
                                ;*REGARDING THE DETECTION OF AN ERROR AS FOLLOWS:
                                ;*
                                ;*      .UNIT NUMBER, DRIVE TYPE, TEST NUMBER, ERROR NUMBER AND
                                ;*PROGRAM COUNTER ARE PRINTED ON THE FIRST LINE;
                                ;*      .ERROR MESSAGE IS ASSEMBLED, FORMATTED AND PRINTED ON
                                ;*ONE OR MORE SUCCEEDING LINES;
                                ;*      .PAIRED LINES OF ERROR HEADERS AND ERROR DATA ARE PRINTED
                                ;*AFTER THE ERROR MESSAGE.
                                ;
060304  104414                  ERRTYP: SAVREG
060306  032777  020000  120640          BIT     #SW13,@SWR      ;INHIBIT TYPEOUTS??
060314  001402                        BEQ     1$              ;NO!!
060316  000137  061114                JMP     27$             ;YES!!
                                ;
                                ;TYPE UNIT NUMBER, DRIVE TYPE, TEST NUMBER, ERROR NUMBER, AND
                                ;PROGRAM COUNTER
060322  104401  001217          1$:     TYPE    ,$CRLF
060326  104401  061130                TYPE    ,ERTY00         ;TYPE "DRV#"
060332  013746  001234                MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
                                                                ;;TYPE DRIVE NUMBER
060336  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
060340     003                        .BYTE   3               ;;TYPE 3 DIGIT(S)
060341     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                ;
                                ;TYPE 'DRIVE TYPE', RM80 FOR UNIT UNDER TEST
060342  013700  001276                MOV     $BASE,R0        ;GET RM BASE ADDRESS
060346  016000  000026                MOV     RMDT(R0),R0     ;GET DRIVE TYPE REGISTER
060352  042700  177740                BIC     #177740,R0      ;SAVE DRIVE TYPE BITS AND
060356  012737  064522  060400        MOV     #$RM80,3$       ;GET ASCII DRIVE TYPE
060364  022700  000026                CMP     #26,R0          ;IS DEVICE AN RM80 ?
060370  001004                        BNE     4$              ;NO !!
060372  104401  061165          2$:     TYPE    ,ERTY05         ;TYPE " - "
060376  104401                        TYPE                    ;TYPE DRIVE TYPE
060400  000000                  3$:     .WORD   0               ;DRIVE TYPE MESSAGE IS STORED HERE
                                ;
                                ;TYPE TEST NUMBER, ERROR NUMBER AND PROGRAM COUNTER
060402  005037  061120          4$:     CLR     TSTNMB          ;LOAD TEST NUMBER FOR
060406  013737  001226  061120        MOV     $TESTN,TSTNMB
060414  104401  061135                TYPE    ,ERTY01         ;TYPE "TST#"
060420  013746  061120                MOV     TSTNMB,-(SP)    ;;SAVE TSTNMB FOR TYPEOUT
                                                                ;;TYPE TEST NUMBER
060424  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
060426     003                        .BYTE   3               ;;TYPE 3 DIGIT(S)
060427     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
060430  005037  061122                CLR     ERRNMB          ;LOAD ERROR NUMBER FOR
060434  113737  001130  061122        MOVB    $ITEMB,ERRNMB   ;TYPEOUT
060442  001406                        BEQ     5$              ;SKIP IF NO ERROR CALLED
060444  104401  061145                TYPE    ,ERTY02         ;TYPE "ERR#"
060450  013746  061122                MOV     ERRNMB,-(SP)    ;;SAVE ERRNMB FOR TYPEOUT
                                                                ;;TYPE ERROR NUMBER
060454  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
060456     003                        .BYTE   3               ;;TYPE 3 DIGIT(S)
060457     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
060460  104401  061154          5$:     TYPE    ,ERTY03         ;TYPE "PC="
```

ERROR TYPEOUT ROUTINE

```
     46 060464  013746  001132                MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                       ;;TYPE PROGRAM COUNTER
        060470  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
        060472     006                        .BYTE   6               ;;TYPE 6 DIGIT(S)
        060473     001                        .BYTE   1               ;;TYPE LEADING ZEROS
     47
     48                                ;GENERATE POINTER TO ERROR TABLE UNLESS ERROR NUMBER IS 0
     49 060474  005737  061122        6$:     TST     ERRNMB          ;WAS AN ERROR CALLED?
     50 060500  001002                        BNE     7$              ;BR IF YES
     51 060502  000137  061114                JMP     27$             ;NO--EXIT
     52
     53 060506  104401  001217        7$:     TYPE    ,$CRLF          ;YES-TYPE CRLF
     54 060512  105037  061126                CLRB    BOTFLG          ;CLEAR BOT FLAG
     55 060516  105037  061127                CLRB    CHRCNT          ;CLEAR CHARACTER COUNTER
     56 060522  013700  061122                MOV     ERRNMB,R0       ;R0 POINTS TO FIRST OF
     57 060526  122700  000177                CMPB    #177,R0         ;SEE IF THIS ERROR CALL IS SPECIAL POWER FAIL CALL
     58 060532  001003                        BNE     8$              ;BRANCH IF NOT
     59 060534  012700  061172                MOV     #PFECH,R0       ;MOVE POWER FAIL ERROR CALL TABLE TO R0
     60 060540  000405                        BR      9$
     61 060542  006300                8$:     ASL     R0              ;FOUR ENTRIES IN ERROR
     62 060544  006300                        ASL     R0              ;TABLE
     63 060546  006300                        ASL     R0
     64 060550  062700  001574                ADD     #$ERRTB-8.,R0
     65 060554  011001                9$:     MOV     (R0),R1         ;R1 POINTS TO ERROR MESSAGE
                                                                       ;TABLE
     66
     67 060556  001507                        BEQ     19$             ;BRANCH IF NO ERROR MESSAGE
     68
     69                                ;TYPE THE ERROR MESSAGE
     70 060560  012102                10$:    MOV     (R1)+,R2        ;R2=ADDRESS OF MESSAGE STRING
     71 060562  001505                        BEQ     19$             ;BRANCH IF END OF MESSAGE
     72 060564  010237  060732                MOV     R2,18$          ;LOAD ADDRESS OF STRING
     73 060570  005037  061124                CLR     BOTADR          ;CLEAR BOT ADDRESS
     74 060574  112203                11$:    MOVB    (R2)+,R3        ;END OF STRING??
     75 060576  001454                        BEQ     17$             ;YES!!
     76 060600  122703  000015                CMPB    #CR,R3          ;CARRIAGE RETURN??
     77 060604  001003                        BNE     12$             ;NO!!
     78 060606  105037  061127                CLRB    CHRCNT          ;YES-CLEAR CHAR COUNT
     79 060612  000770                        BR      11$             ;GET NEXT CHARACTER
     80 060614  122703  000012                CMPB    #LF,R3          ;LINE FEED??
     81 060620  001765                        BEQ     11$             ;YES-GET NEXT CHARACTER
     82 060622  122703  000011                CMPB    #HT,R3          ;HORIZONTAL TAB??
     83 060626  001007                        BNE     14$             ;NO!!
     84 060630  105237  061127                INCB    CHRCNT          ;ADJUST CHARACTER COUNT
     85 060634  132737  000007  061127        BITB    #7,CHRCNT
     86 060642  001372                        BNE     13$
     87 060644  000407                        BR      15$
     88 060646  105237  061127        14$:    INCB    CHRCNT          ;INCREMENT CHARACTER COUNT
     89 060652  122703  000040                CMPB    #' ,R3          ;SPACE??
     90 060656  001002                        BNE     15$             ;NO!!
     91 060660  010237  061124                MOV     R2,BOTADR       ;SAVE ADDRESS OF SPACE
     92 060664  122737  000100  061127 15$:   CMPB    #64.,CHRCNT     ;END OF LINE??
     93 060672  103340                        BHIS    11$             ;NO!!
     94 060674  013704  061124                MOV     BOTADR,R4       ;GET ADDRESS OF LAST SPACE
     95 060700  001007                        BNE     16$             ;BRANCH IF SPACE DETECTED
     96 060702  104401  001217                TYPE    ,$CRLF          ;TYPE CRLF
     97 060706  105037  061127                CLRB    CHRCNT          ;CLEAR CHARACTER COUNT
     98 060712  013702  060732                MOV     18$,R2          ;SET UP R2 FOR TESTING
```

ERROR TYPEOUT ROUTINE

```
 99 060716  000726                        BR      11$
100 060720  105044              16$:      CLRB    -(R4)           ;REPLACE SPACE
101 060722  112737  177777  061126        MOVB    #-1,BOTFLG      ;SET BOT FLAG
102 060730  104401              17$:      TYPE                    ;TYPE ERROR MESSAGE STRING
103 060732  000000              18$:      .WORD                   ;STRING ADDRESS GOES HERE
104 060734  105737  061126                TSTB    BOTFLG          ;WAS STRING TRUNCATED??
105 060740  001707                        BEQ     10$             ;NO!!
106 060742  104401  001217                TYPE    ,$CRLF          ;YES-TYPE CRLF
107 060746  105037  061126                CLRB    BOTFLG          ;CLEAR BOT FLAG
108 060752  105037  061127                CLRB    CHRCNT          ;CLEAR CHARACTER COUNT
109 060756  013702  061124                MOV     BOTADR,R2       ;SETUP R2 FOR TESTING
110 060762  010237  060732                MOV     R2,18$          ;SETUP 18$ FOR TYPING
111 060766  112742  000040                MOVB    #' ,-(R2)       ;RESTORE SPACE
112 060772  105722                        TSTB    (R2)+           ;RESTORE R2
113 060774  000677                        BR      11$             ;TYPE REST OF STRING
114
115                             ;TYPE ERROR HEADER AND ERROR DATA
116 060776  016001  000002      19$:      MOV     2(R0),R1        ;R1 POINTS TO ERROR HEADER TABLE
117 061002  001444                        BEQ     27$             ;BRANCH IF NO HEADER
118 061004  104401  001217                TYPE    ,$CRLF          ;(ASSUME NO DATA)
119 061010  016002  000004                MOV     4(R0),R2        ;R2 POINTS TO DATA ADDRESS TABLE
120 061014  016003  000006                MOV     6(R0),R3        ;R3 POINTS TO FORMAT TABLE
121 061020  012137  061030      20$:      MOV     (R1)+,21$       ;PUT HEADER ADDRESS FOR TYPE
122 061024  001433                        BEQ     27$             ;BRANCH IF END OF HEADERS
123                                                               ;(ASSUME END OF DATA)
124 061026  104401                        TYPE
125 061030  000000              21$:      .WORD   0               ;HEADER ADDRESS GOES HERE
126 061032  104401  001217                TYPE    ,$CRLF
127 061036  005702                        TST     R2              ;DATA WITH HEADER??
128 061040  001767                        BEQ     20$             ;NO!!
129 061042  012204                        MOV     (R2)+,R4        ;R4 POINTS TO DATA ADDRESS
130 061044  012305                        MOV     (R3)+,R5        ;R5 POINTS TO FORMAT
131 061046  105725              22$:      TSTB    (R5)+           ;WHAT KIND OF DATA??
132 061050  100407                        BMI     24$             ;BINARY
133 061052  001403                        BEQ     23$             ;OCTAL
134 061054  013446                        MOV     @(R4)+,-(SP)    ;DECIMAL
135 061056  104405                        TYPDS
136 061060  000405                        BR      25$
137 061062  013446              23$:      MOV     @(R4)+,-(SP)
138 061064  104402                        TYPOC
139 061066  000402                        BR      25$
140 061070  013446              24$:      MOV     @(R4)+,-(SP)
141 061072  104406                        TYPBN
142 061074  005714              25$:      TST     (R4)            ;MORE DATA??
143 061076  001403                        BEQ     26$             ;NO!!
144 061100  104401  061162                TYPE    ,ERTY04         ;YES-TYPE 2 SPACES
145 061104  000760                        BR      22$             ;AND CONTINUE
146 061106  104401  001217      26$:      TYPE    ,$CRLF          ;TYPE ONE BLANK LINE
147 061112  000742                        BR      20$             ;BEFORE NEXT HEADER
148 061114  104415              27$:      RESREG
149 061116  000207                        RTS     PC
150
151 061120  000000              TSTNMB:   .WORD   0               ;TEST NUMBER
152 061122  000000              ERRNMB:   .WORD   0               ;ERROR NUMBER
153 061124  000000              BOTADR:   .WORD   0               ;BEGINNING OF TEXT ADDRESS
154 061126     000              BOTFLG:   .BYTE   0               ;BOT FLAG
155 061127     000              CHRCNT:   .BYTE   0               ;CHARACTER COUNT
```

ERROR TYPEOUT ROUTINE

```
    156
    157 061130      104      122      126  ERTY00: .ASCIZ  @DRV#@
    158 061135      054      040      124  ERTY01: .ASCIZ  @, TEST#@
    159 061145      054      040      105  ERTY02: .ASCIZ  @, ERR#@
    160 061154      054      040      120  ERTY03: .ASCIZ  @, PC=@
    161 061162      040      040      000  ERTY04: .ASCIZ  @ @
    162 061165      040      055      040  ERTY05: .ASCIZ  @ - @
    163                                    .EVEN
    164 061172  061202  061270  061306  PFECH:  PFECH1,PFECH2,PFECH3,PFECH4 ;WORDS DEFINING TABLES BELOW
    165 061202  061206  000000          PFECH1: .+4,0
    166 061206      120      117      127      .ASCIZ  ?POWER MONITOR BIT IN CPU ERROR REGISTER FOUND SET?
    167                                    .EVEN
    168 061270  061274  000000          PFECH2: .+4,0
    169 061274      103      120      125      .ASCIZ  ?CPUERREG?
    170                                    .EVEN
    171 061306  061310                  PFECH3: .+2
    172 061310  060300  000000                  .WORD   CPSAVE,0
    173 061314  061316                  PFECH4: .+2
    174 061316      200      000                .BYTE   0,0
```

```
      1                                 .SBTTL  TTY INPUT ROUTINE

                                        ;;*****************************************************************
                                        .ENABL  LSB
      061320  000000                    $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
      061322  000000                    $TKQIN: .WORD   0               ;;INPUT POINTER
      061324  000000                    $TKQOUT: .WORD  0               ;;OUTPUT POINTER
      061326                            $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
              061327                    $TKQEND=.
                                        .EVEN

                                        ;*TK INITIALIZE ROUTINE
                                        ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
                                        ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
                                        ;
                                        ;*CALL:
                                        ;*      JSR     PC,$TKINT
                                        ;*      RETURN
                                        ;
      061330  005037  061320            $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
      061334  012737  061326  061322            MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
      061342  013737  061322  061324            MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
      061350  012737  061400  000060            MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
      061356  012737  000200  000062            MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
      061364  005777  117572                    TST     @$TKB           ;;CLEAR DONE FLAG
      061370  012777  000100  117562            MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
      061376  000207                            RTS     PC              ;;RETURN TO CALLER

                                        ;*TK SERVICE ROUTINE
                                        ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                        ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                        ;*IT IN THE QUEUE.
                                        ;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
                                        ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (SHUT2)
                                        ;
      061400  117746  117556            $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
      061404  042716  177600                    BIC     #^C177,(SP)     ;;STRIP THE JUNK
      061410  021627  000021                    CMP     (SP),#$XON      ;;IS IT A RANDOM XON?
      061414  001002                            BNE     30$             ;;BRANCH IF NO
      061416  005726                            TST     (SP)+           ;;CLEAN RANDOM XON OFF STACK
      061420  000002                            RTI                     ;;RETURN
      061422                            30$:
      061422  021627  000003                    CMP     (SP),#3         ;;IS IT A CONTROL C?
      061426  001007                            BNE     1$              ;;BRANCH IF NO
      061430  104401  062526                    TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
      061434  004737  061330                    JSR     PC,$TKINT       ;;INIT THE KEYBOARD
      061440  005726                            TST     (SP)+           ;;CLEAN UP STACK
      061442  000137  062570                    JMP     SHUT2           ;;CONTROL C RESTART
      061446  021627  000007            1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
      061452  001004                            BNE     2$              ;;BRANCH IF NO
      061454  022737  000176  001154            CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
      061462  001500                            BEQ     6$              ;;GO TO SWR CHANGE

      061464                            2$:
      061464  022737  000001  061320            CMP     #1,$TKCNT       ;;IS THE QUEUE FULL?
      061472  001004                            BNE     3$              ;;BRANCH IF NO
      061474  104401  001212                    TYPE    ,$BELL          ;;RING THE TTY BELL
```

```
061500  005726                          TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
061502  000451                          BR      5$              ;;EXIT
061504  021627  000023          3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
061510  001021                          BNE     32$             ;;BRANCH IF NO
061512  005077  117442                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
061516  005726                          TST     (SP)+           ;;CLEAN CHAR OFF STACK
061520  105777  117434          31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
061524  100375                          BPL     31$             ;;LOOP UNTIL ITS THERE
061526  117746  117430                  MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
061532  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
061536  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
061542  001366                          BNE     31$             ;;BRANCH IF NO
061544  012777  000100  117406          MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
061552  000002                          RTI                     ;;RETURN
061554  005237  061320          32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
061560  021627  000140                  CMP     (SP),#140       ;;IS IT UPPER CASE?
061564  002405                          BLT     4$              ;;BRANCH IF YES
061566  021627  000175                  CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
061572  003002                          BGT     4$              ;;BRANCH IF YES
061574  042716  000040                  BIC     #40,(SP)        ;;MAKE IT UPPER CASE
061600  112677  177516          4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
061604  005237  061322                  INC     $TKQIN          ;;UPDATE THE POINTER
061610  023727  061322  061327          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
061616  001003                          BNE     5$              ;;BRANCH IF NO
061620  012737  061326  061322          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
061626  000002                  5$:     RTI                     ;;RETURN

                        ;;**********************************************************************
                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                        ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
                        ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
061630  022737  000176  001154  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
061636  001124                          BNE     15$             ;;EXIT IF NOT
061640  105777  117314                  TSTB    @$TKS           ;;IS A CHAR WAITING?
061644  100121                          BPL     15$             ;;IF NOT, EXIT
061646  117746  117310                  MOVB    @$TKB,-(SP)     ;;YES
061652  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
061656  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
061662  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
                                                                ;;AND EXIT

                        ;;**********************************************************************
                        ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
                        ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
                        ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
061664  123727  001150  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
061672  001674                          BEQ     2$              ;;BRANCH IF YES
061674  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
061676  004737  061330                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
061702  005077  117252                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
061706  112737  000001  001151          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR

061714  104401  062540                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
061720  104401  062545  $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
061724  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
061730  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
```

```
061732  104401  062556                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
061736  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
061740  005046                          CLR     -(SP)           ;;THE NEW SWR
061742  105777  117212          7$:     TSTB    @$TKS           ;;CHAR THERE?
061746  100375                          BPL     7$              ;;IF NOT TRY AGAIN

061750  117746  117206                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
061754  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII

061760  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
061764  001015                          BNE     9$              ;;BRANCH IF NOT
061766  104401  062526                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
061772  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
061776  123727  001151  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
062004  001003                          BNE     8$              ;;BRANCH IF NO
062006  012777  000100  117144          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
062014  000137  062570          8$:     JMP     SHUT2           ;;CONTROL-C RESTART


062020  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
062024  001005                          BNE     10$             ;;BRANCH IF NOT
062026  104401  062533                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
062032  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
062036  000737                          BR      19$             ;;LET'S TRY IT AGAIN


062040  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
062044  001022                          BNE     16$             ;;BRANCH IF NO
062046  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
062052  001403                          BEQ     11$             ;;BRANCH IF YES
062054  016677  000002  117072          MOV     2(SP),@SWR      ;;SAVE NEW SWR
062062  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
062066  104401  001217          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
062072  123727  001151  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
062100  001003                          BNE     15$             ;;BRANCH IF NOT
062102  012777  000100  117050          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
062110  000002                  15$:    RTI                     ;;RETURN
062112  004737  056772          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
062116  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
062122  002420                          BLT     18$             ;;BRANCH IF YES
062124  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
062130  003015                          BGT     18$             ;;BRANCH IF YES
062132  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
062136  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
062142  001403                          BEQ     17$             ;;BRANCH IF YES
062144  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
062146  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
062150  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
062152  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
062156  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
062162  000667                          BR      7$              ;;GET THE NEXT ONE
062164  104401  001216          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
062170  000720                          BR      20$             ;;SIMULATE CONTROL-U
                                .DSABL  LSB

                                ;;*****************************************************************
```

```
                                ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                                ;*CALL:
                                ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
                                ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                                ;*                              ;;WITH PARITY BIT STRIPPED OFF
                                ;
062172  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
062174  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
062202  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
062206  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
062210  012746  062216                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
062214  000002                          RTI                     ;;POP NEW PC AND PS
062216                          64$:
062216  005737  061320          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
062222  001775                          BEQ     1$
062224  005337  061320                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
062230  117766  177070  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
062236  005237  061324                  INC     $TKQOUT         ;;UPDATE THE POINTER
062242  023727  061324  061327          CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
062250  001003                          BNE     2$              ;;BRANCH IF NO
062252  012737  061326  061324          MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
062260  000002                  2$:     RTI                     ;;RETURN
                                ;;**************************************************************
                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                ;*CALL:
                                ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S

062262  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
062264  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
062266  012703  062516          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
062272  022703  062526          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
062276  101456                          BLOS    4$              ;;BR IF YES
062300  104411                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
062302  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
062304  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
062310  001022                          BNE     5$              ;;BR IF NO
062312  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
062314  001007                          BNE     6$              ;;BR IF NO
062316  112737  000134  062514          MOVB    #'\,9$          ;;TYPE A BACK SLASH
062324  104401  062514                  TYPE    ,9$
062330  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
062334  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
062336  020327  062516                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
062342  103434                          BLO     4$              ;;BR IF YES
062344  111337  062514                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
062350  104401  062514                  TYPE    ,9$             ;;GO TYPE
062354  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
062356  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
062360  001406                          BEQ     7$              ;;BR IF NO
062362  112737  000134  062514          MOVB    #'\,9$          ;;TYPE A BACK SLASH
062370  104401  062514                  TYPE    ,9$
062374  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
062376  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
062402  001003                          BNE     8$              ;;BR IF NO
```

```
062404  104401  062533                  TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U''
062410  000726                          BR      1$              ;;GO START OVER
062412  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A ''^R''?
062416  001011                          BNE     3$              ;;BRANCH IF NO
062420  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
062422  104401  001217                  TYPE    ,$CRLF          ;;TYPE A ''CR'' & ''LF''
062426  104401  062516                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
062432  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
062434  104401  001216          4$:     TYPE    ,$QUES          ;;TYPE A '?'
062440  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
062442  111337  062514          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
062446  104401  062514                  TYPE    ,9$
062452  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
062456  001305                          BNE     2$              ;;LOOP IF NOT RETURN
062460  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
062464  104401  001220                  TYPE    ,$LF            ;;TYPE A LINE FEED
062470  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
062472  012603                          MOV     (SP)+,R3        ;;RESTORE R3
062474  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
062476  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
062504  012766  062516  000004          MOV     #$TTYIN,4(SP)
062512  000002                          RTI                     ;;RETURN
062514     000          9$:     .BYTE   0                       ;;STORAGE FOR ASCII CHAR. TO TYPE
062515     000                  .BYTE   0                       ;;TERMINATOR
062516                  $TTYIN: .BLKB   8.                      ;;RESERVE 8 BYTES FOR TTY INPUT
062526     136     103     015  $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL ''C''
062533     136     125     015  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL ''U''
062540     136     107     015  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL ''G''
062545     015     012     123  $MSWR:  .ASCIZ  <15><12>/SWR = /
062556     040     040     116  $MNEW:  .ASCIZ  /  NEW = /
                                .EVEN
2
3 062570  012737  177777  001326  SHUT2:  MOV     #-1,CTLFG       ;SET THE CONTROL-C FLAG
4 062576  105737  001116                  TSTB    $TSTNM          ;DOING ANY TESTS ?
5 062602  001002                          BNE     1$              ;BR IF YES
6 062604  000137  031422                  JMP     SHUT            ;NO--RESPOND TO ^C
7 062610  000002                  1$:     RTI                     ;EXIT FROM INTERRUPT
```

READ AN OCTAL NUMBER FROM THE TTY

```
      1                                 .SBTTL  READ AN OCTAL NUMBER FROM THE TTY

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
                                        ;*CHANGE IT TO BINARY.
                                        ;*CALL:
                                        ;*      RDOCT                   ;;READ AN OCTAL NUMBER
                                        ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
                                        ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT

062612  011646                  $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
062614  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
062622  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
062624  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
062626  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
062630  104412                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
062632  012600                          MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
062634  005001                          CLR     R1              ;;CLEAR DATA WORD
062636  005002                          CLR     R2
062640  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
062642  001412                          BEQ     3$              ;;IF ZERO GET OUT
062644  006301                          ASL     R1              ;;*2
062646  006102                          ROL     R2
062650  006301                          ASL     R1              ;;*4
062652  006102                          ROL     R2
062654  006301                          ASL     R1              ;;*8
062656  006102                          ROL     R2
062660  042716  177770                  BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
062664  062601                          ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
062666  000764                          BR      2$              ;;LOOP
062670  005726                  3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
062672  010166  000012                  MOV     R1,12(SP)       ;;SAVE THE RESULT
062676  010237  062712                  MOV     R2,$HIOCT
062702  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
062704  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
062706  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
062710  000002                          RTI                     ;;RETURN
062712  000000                  $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
```

```
                                .SBTTL  TRAP DECODER

                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;*GO TO THAT ROUTINE.

062714  016646  000002          $TRAP:  MOV     2(SP),-(SP)     ;;ASSUME THE STATUS OF
062720  042716  000020                  BIC     #20,(SP)        ;; THE CALLER--DO NOT ALLOW
062724  012746  062732                  MOV     #1$,-(SP)       ;; T-BIT TRAPS
062730  000002                          RTI                     ;;SET THE NEW STATUS
062732  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
062734  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
062740  005740                          TST     -(R0)           ;;BACKUP BY 2
062742  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
062744  006300                          ASL     R0              ;;POSITION FOR INDEXING
062746  016000  062766                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
062752  000200                          RTS     R0              ;;GO TO ROUTINE


                                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

062754  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
062756  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
062764  000002                          RTI                     ;;RESTORE THE PSW

                                .SBTTL  TRAP TABLE

                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                ;*BY THE "TRAP" INSTRUCTION.

                                ;       ROUTINE
                                ;       -------
062766  062754          $TRPAD: .WORD   $TRAP2
062770  056560                  $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
062772  056356                  $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
062774  056332                  $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
062776  056372                  $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
063000  056106                  $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
063002  056032                  $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER

063004  061720                  $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING

063006  061630                  $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
063010  062172                  $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
063012  062262                  $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
063014  062612                  $RDOCT  ;;CALL=RDOCT    TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY
063016  055736                  $SAVREG ;;CALL=SAVREG   TRAP+14(104414) SAVE R0-R5 ROUTINE
063020  055774                  $RESREG ;;CALL=RESREG   TRAP+15(104415) RESTORE R0-R5 ROUTINE
```

POWER DOWN AND UP ROUTINES

```
                                        .SBTTL  POWER DOWN AND UP ROUTINES

                                        ;;*****************************************************************
                                        ;POWER DOWN ROUTINE
063022  012737  063162  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
063030  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
063036  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
063040  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
063042  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
063044  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
063046  010446                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
063050  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
063052  017746  116076                MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
063056  010637  063166                MOV     SP,$SAVR6       ;;SAVE SP
063062  012737  063074  000024        MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
063070  000000                        HALT
063072  000776                        BR      .-2             ;;HANG UP

                                        ;;*****************************************************************
                                        ;POWER UP ROUTINE
063074  012737  063162  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
063102  013706  063166                MOV     $SAVR6,SP       ;;GET SP
063106  005037  063166                CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
063112  005237  063166          1$:   INC     $SAVR6          ;;WAIT FOR THE INC
063116  001375                        BNE     1$              ;;OF  WORD
063120  012677  116030                MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
063124  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
063126  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
063130  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
063132  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
063134  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
063136  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
063140  012737  063022  000024        MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
063146  012737  000340  000026        MOV     #340,@#PWRVEC+2 ;;PRIO:7
063154  104401                        TYPE                    ;REPORT THE POWER FAILURE
063156  063170          $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
063160  000002                        RTI
063162  000000          $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
063164  000776                        BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
063166  000000          $SAVR6: 0                       ;;PUT THE SP HERE
063170     015     012     120  $POWER: .ASCIZ  <15><12>'POWER'
                                        .EVEN
```

```
                                        .SBTTL  APT COMMUNICATIONS ROUTINE

                                        ;;**********************************************************************
063200  112737  000001  063444  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
063206  112737  000001  063442  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
063214  000403                        BR      $ATYC
063216  112737  000001  063444  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
063224                          $ATYC:
063224  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
063226  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
063230  105737  063442                TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
063234  001450                        BEQ     5$              ;;IF NOT:  BR
063236  122737  000001  001242        CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
063244  001031                        BNE     3$              ;;IF NOT:  BR
063246  132737  000100  001243        BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
063254  001425                        BEQ     3$              ;;IF NOT:  BR
063256  017600  000004                MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
063262  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
063270  005737  001222          1$:   TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
063274  001375                        BNE     1$              ;;IF NOT:  WAIT
063276  010037  001236                MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
063302  105720                  2$:   TSTB    (R0)+           ;;FIND END OF MESSAGE
063304  001376                        BNE     2$
063306  163700  001236                SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
063312  006200                        ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
063314  010037  001240                MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
063320  012737  000004  001222        MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
063326  000413                        BR      5$
063330  017637  000004  063354  3$:   MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
063336  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
063344  013746  177776                MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
063350  004737  056560                JSR     PC,$TYPE        ;;CALL TYPE MACRO
063354  000000                  4$:   .WORD   0
063356                          5$:
063356  105737  063444          10$:  TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
063362  001416                        BEQ     12$             ;;IF NOT:  BR
063364  005737  001242                TST     $ENV            ;;RUNNING UNDER APT?
063370  001413                        BEQ     12$             ;;IF NOT:  BR
063372  005737  001222          11$:  TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
063376  001375                        BNE     11$             ;;IF NOT:  WAIT
063400  017637  000004  001224        MOV     @4(SP),$FATAL   ;;GET ERROR #
063406  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
063414  005237  001222                INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
063420  105037  063444          12$:  CLRB    $FFLG           ;;CLEAR FATAL FLAG
063424  105037  063443                CLRB    $LFLG           ;;CLEAR LOG FLAG
063430  105037  063442                CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
063434  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
063436  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
063440  000207                        RTS     PC              ;;RETURN
063442     000          $MFLG:  .BYTE  0               ;;MESSG. FLAG
063443     000          $LFLG:  .BYTE  0               ;;LOG FLAG
063444     000          $FFLG:  .BYTE  0               ;;FATAL FLAG
                                .EVEN
            000200      APTSIZE = 200
            000001      APTENV  = 001
            000100      APTSPOOL= 100
            000040      APTCSUP = 040
```

CONSOLE MESSAGES

```
                                        .SBTTL  CONSOLE MESSAGES
 2
 3 063446  200  103  101  SCTMSG: .ASCIZ  <CRLF>@CANNOT RECOVER THE BAD SECTOR FILES ON THIS DEVICE@
 4 063532  075  000       EQUALS: .ASCIZ  @=@
 5 063534  101  114  114  ALL:    .ASCIZ  @ALL@<CRLF>
 6 063541  040  077  040  QUES:   .ASCIZ  @ ? @
 7 063545  054  040  000  COMMA:  .ASCIZ  @, @
 8 063550  200  124  117  MSHELP: .ASCII  <CRLF>@TO  ENSURE THAT  NO BAD HEADERS ARE LEFT  ON THE DISK@
 9 063636  200  104  125           .ASCII  <CRLF>@DURING  ERROR FREE OPERATION,  THIS PROGRAM SHOULD BE@
10 063724  200  102  105           .ASCII  <CRLF>@BE  HALTED BY TYPING  A (^C) CONTROL C.  AS A RESULT,@
11 064012  200  124  110           .ASCII  <CRLF>@THE PROGRAM WILL  BE HALTED WHEN THE DRIVE UNDER TEST@
12 064100  200  110  101           .ASCII  <CRLF>@HAS COMPLETED TESTING.@
13 064127  200                    .ASCII  <CRLF>
14 064130  200  124  131           .ASCIZ  <CRLF>@TYPE HELP TEXT (L) N ? @
15 064161  200  122  115  CNSL01: .ASCIZ  <CRLF>@RMCS1=@
16 064171  040  114  111  CNSL02: .ASCIZ  @ LIMITS - LO= 160000, HI= 17XXXX@<CRLF>
17 064233  122  115  126  CNSL03: .ASCIZ  @RMVEC=@
18 064242  040  114  111  CNSL04: .ASCIZ  @ LIMITS - LO= 0, HI= 1000@<CRLF><LF>
19 064276  200  124  131  CNSL07: .ASCII  <CRLF>@TYPE "A" TO TEST ALL DRIVES, OR TYPE DRIVE NUMBER(S)@
20 064363  200  101  116           .ASCIZ  <CRLF>@AND TERMINATE INPUT WITH A CARRIAGE RETURN.@
21 064440  200                    CNSL08: .ASCII  <CRLF>
22 064441  040  077  111  CNSL09: .ASCIZ  @ ?ILLEGAL INPUT@<CRLF>
23 064462  200  104  122  MSDRVS: .ASCIZ  <CRLF>/DRIVE(S): /
24 064476  104  122  111  MSGDRV: .ASCIZ  /DRIVE/
25 064504  200  125  116  SYSTAT: .ASCIZ  <CRLF>/UNIT STATUS:/
26 064522  122  115  070  $RM80:  .ASCIZ  /RM80/
27 064527  040  116  117  NOTRM:  .ASCIZ  / NOT AN RM80/
28 064544  040  114  117  LODEV:  .ASCIZ  / LOAD DEVICE/
29 064561  040  116  117  NOTPRS: .ASCIZ  / NOT PRESENT/
30 064576  040  116  117  NOTAVL: .ASCIZ  / NOT AVAILABLE/
31 064615  040  117  106  UNTOFF: .ASCIZ  / OFFLINE/
32 064626  040  117  116  UNTON:  .ASCIZ  / ONLINE/
33 064636  200  104  122  DRIVES: .ASCIZ  <CRLF>/DRIVE(S) TO BE TESTED/
34 064665  116  117  116  NONE:   .ASCIZ  /NONE/
35 064672  116  000       N:      .ASCIZ  /N/
36 064674  131  000       Y:      .ASCIZ  /Y/
37 064676  040            BLNKS4: .ASCII  / /
38 064677  040            BLNKS3: .ASCII  / /
39 064700  040            BLNKS2: .ASCII  / /
40 064701  040  000       BLNKS1: .ASCIZ  / /
41                         .EVEN
```

```
                        .SBTTL  FUNCTION CODE TABLE

                        ;THE FUNCTION CODE TABLE IS USED TO DEFINE STATUS CONDITIONS FOR
                        ;EACH FUNCTION CODE.  BIT USAGE IS AS FOLLOWS:

                        ;       ATA - BIT 15 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF ATA SHOULD BE SET WHEN THE FUNCTION CODE IS EXECUTED, OTHERWISE,
                        ;BIT 15 IS ZERO, INDICATING THAT ATA SHOULD NOT NORMALLY BE SET.
                        ;NOTE THAT ATA MAY BE SET WHEN A COMMAND IS EXECUTED EVEN THOUGH
                        ;IT IS NOT EXPECTED AS A RESULT OF THE COMMAND.

                        ;       WCE - BIT 14 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF WRITE CHECK ERRORS ARE ENABLED AS A FUNCTION OF THE COMMAND.

                        ;       OPI - BIT 13 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF OPI ERRORS ARE ENABLED DURING THE EXECUTION OF THAT COMMAND.

                        ;       IVC - BIT 12 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF IVC ERRORS ARE ENABLED DURING THE EXECUTION OF THAT COMMAND.

                        ;       WLE - BIT 11 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF WRITE ERRORS ARE ENABLED DURING THE EXECUTION OF THAT COMMAND.
                        ;THE WRITE ERRORS WHICH ARE ENABLED ARE "WLE", "WCF", "DPE", "UPE".

                        ;       IAE - BIT 10 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF INVALID ADDRESS ERROR IS ENABLED FOR THAT COMMAND.

                        ;       AOE - BIT 09 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF READ AND WRITE ERRORS ARE ENABLED DURING THE EXECUTION OF THE
                        ;COMMAND.  THE ERRORS ENABLED BY THIS BIT ARE "TRE", "DLT", "NEM",
                        ;"MXF", "LBT", AND "AOE".

                        ;               BIT 08 IS NOT USED.

                        ;       HCE - BIT 07 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF HEADER ERRORS ARE ENABLED DURING THE EXECUTION OF THAT COMMAND.
                        ;HEADER ERRORS INCLUDE "HCRC", "HCE", "FER", AND "BSE".

                        ;       ECH - BIT 06 IS SET IN THE ENTRY FOR A GIVEN FUNCTION CODE
                        ;IF DATA FIELD ERRORS ARE ENABLED DURING THE EXECUTION OF THAT
                        ;COMMAND.  THESE ERRORS INCLUDE "MDPE", "DCK", AND "ECH".

                        ;               BIT 05 IS NOT USED.

                        ;               BIT 04 IS NOT USED.

                        ;               BIT 03 IS NOT USED.

                        ;               BIT 02 IS NOT USED.

                        ;               BIT 01 IS NOT USED.

                        ;       ILF - BIT 00 IS SET IF THE FUNCTION CODE IS ILLEGAL.

064704                  FNCDTB:                                 ;FUNCTION CODE TABLE

064704  020000          .WORD   OPI                             ;NOP
```

FUNCTION CODE TABLE

```
     58 064706  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (2)
     59 064710  132000                .WORD   ATA!OPI!IVC!IAE                 ;SEEK
     60 064712  130000                .WORD   ATA!OPI!IVC                     ;RECALIBRATE
     61 064714  020000                .WORD   OPI                             ;DRIVE CLEAR
     62 064716  030000                .WORD   OPI!IVC                         ;RELEASE
     63 064720  130000                .WORD   OPI!ATA!IVC                     ;OFFSET
     64 064722  130000                .WORD   OPI!ATA!IVC                     ;RETURN TO CENTERLINE
     65 064724  020000                .WORD   OPI                             ;READ IN PRESET
     66 064726  020000                .WORD   OPI                             ;PACK ACKNOWLEDGE
     67 064730  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (24)
     68 064732  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (26)
     69 064734  132000                .WORD   ATA!OPI!IVC!IAE                 ;SEARCH
     70 064736  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (32)
     71 064740  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (34)
     72 064742  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (36)
     73 064744  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (40)
     74 064746  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (42)
     75 064750  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (44)
     76 064752  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (46)
     77 064754  073300                .WORD   WCE!OPI!IVC!IAE!AOE!HCE!ECH     ;WRITE CHECK DATA
     78 064756  073300                .WORD   WCE!OPI!IVC!IAE!AOE!HCE!ECH     ;WRITE CHECK HEADER AND DATA
     79 064760  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (54)
     80 064762  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (56)
     81 064764  037200                .WORD   OPI!IVC!WLE!IAE!AOE!HCE         ;WRITE DATA
     82 064766  037000                .WORD   OPI!IVC!WLE!IAE!AOE             ;WRITE HEADER AND DATA
     83 064770  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (64)
     84 064772  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (66)
     85 064774  033300                .WORD   OPI!IVC!IAE!AOE!HCE!ECH         ;READ DATA
     86 064776  033300                .WORD   OPI!IVC!IAE!AOE!HCE!ECH         ;READ HEADER AND DATA
     87 065000  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (74)
     88 065002  130001                .WORD   OPI!ATA!ILF!IVC                 ;ILLEGAL FUNCTION (76)
```

ATTENTION (ATA) TABLE

```
                                .SBTTL  ATTENTION (ATA) TABLE

                        ATNTBL: .BYTE   1.
                                .BYTE   2.
                                .BYTE   4.
                                .BYTE   8.
                                .BYTE   16.
                                .BYTE   32.
                                .BYTE   64.
                                .BYTE   128.
```

DATA PATTERN TABLE

```
                                .SBTTL  DATA PATTERN TABLE

                        RGDTPT:
                        MIXED:
065014                          .WORD   0.
065016  000001                  .WORD   1.
065020  000003                  .WORD   3.
065022  000007                  .WORD   7.
065024  000017                  .WORD   15.
065026  000037                  .WORD   31.
065030  000077                  .WORD   63.
065032  000177                  .WORD   127.
065034  000377                  .WORD   255.
065036  000777                  .WORD   511.
065040  001777                  .WORD   1023.
065042  003777                  .WORD   2047.
065044  007777                  .WORD   4095.
065046  017777                  .WORD   8191.
06505C  037777                  .WORD   16383.
065052  077777                  .WORD   32767.
065054  177777          ONES:   .WORD   65535.
065056  177777                  .WORD   65535.
065060  077777                  .WORD   32767.
065062  037777                  .WORD   16383.
065064  017777                  .WORD   8191.
065066  007777                  .WORD   4095.
065070  003777                  .WORD   2047.
065072  001777                  .WORD   1023.
065074  000777                  .WORD   511.
065076  000377                  .WORD   255.
065100  000177                  .WORD   127.
065102  000077                  .WORD   63.
065104  000037                  .WORD   31.
065106  000017                  .WORD   15.
065110  000007                  .WORD   7.
065112  000003                  .WORD   3.
065114  000001                  .WORD   1.
065116  000000          ZEROS:  .WORD   0.
065120  000000                  .WORD   0.
065122  000001                  .WORD   1.
065124  000002                  .WORD   2.
065126  000004                  .WORD   4.
065130  000010                  .WORD   8.
065132  000020                  .WORD   16.
065134  000040                  .WORD   32.
065136  000100                  .WORD   64.
065140  000200                  .WORD   128.
065142  000400                  .WORD   256.
065144  001000                  .WORD   512.
065146  002000                  .WORD   1024.
065150  004000                  .WORD   2048.
065152  010000                  .WORD   4096.
065154  020000                  .WORD   8192.
065156  040000                  .WORD   16384.
065160  100000                  .WORD   32768.
065162  100000                  .WORD   32768.
065164  040000                  .WORD   16384.
```

DATA PATTERN TABLE

```
 58 065166  020000                    .WORD   8192.
 59 065170  010000                    .WORD   4096.
 60 065172  004000                    .WORD   2048.
 61 065174  002000                    .WORD   1024.
 62 065176  001000                    .WORD   512.
 63 065200  000400                    .WORD   256.
 64 065202  000200                    .WORD   128.
 65 065204  000100                    .WORD   64.
 66 065206  000040                    .WORD   32.
 67 065210  000020                    .WORD   16.
 68 065212  000010                    .WORD   8.
 69 065214  000004                    .WORD   4.
 70 065216  000002                    .WORD   2.
 71 065220  000001                    .WORD   1.
 72 065222  000000                    .WORD   0.
 73 065224  177777                    .WORD   65535.
 74 065226  177776                    .WORD   65534.
 75 065230  177774                    .WORD   65532.
 76 065232  177770                    .WORD   65528.
 77 065234  177760                    .WORD   65520.
 78 065236  177740                    .WORD   65504.
 79 065240  177700                    .WORD   65472.
 80 065242  177600                    .WORD   65408.
 81 065244  177400                    .WORD   65280.
 82 065246  177000                    .WORD   65024.
 83 065250  176000                    .WORD   64512.
 84 065252  174000                    .WORD   63488.
 85 065254  170000                    .WORD   61440.
 86 065256  160000                    .WORD   57344.
 87 065260  140000                    .WORD   49152.
 88 065262  100000                    .WORD   32768.
 89 065264  000000                    .WORD   0.
 90 065266  000000                    .WORD   0.
 91 065270  100000                    .WORD   32768.
 92 065272  140000                    .WORD   49152.
 93 065274  160000                    .WORD   57344.
 94 065276  170000                    .WORD   61440.
 95 065300  174000                    .WORD   63488.
 96 065302  176000                    .WORD   64512.
 97 065304  177000                    .WORD   65024.
 98 065306  177400                    .WORD   65280.
 99 065310  177600                    .WORD   65408.
100 065312  177700                    .WORD   65472.
101 065314  177740                    .WORD   65504.
102 065316  177760                    .WORD   65520.
103 065320  177770                    .WORD   65528.
104 065322  177774                    .WORD   65532.
105 065324  177776                    .WORD   65534.
106 065326  177777                    .WORD   65535.
107 065330  125252            EARLY:  .WORD   43690.
108 065332  152525                    .WORD   43690./2
109 065334  125252                    .WORD   43690.
110 065336  177777                    .WORD   65535.
111 065340  177776                    .WORD   65534.
112 065342  177775                    .WORD   65533.
113 065344  177773                    .WORD   65531.
114 065346  177767                    .WORD   65527.
```

DATA PATTERN TABLE

```
    115 065350  177757                          .WORD   65519.
    116 065352  177737                          .WORD   65503.
    117 065354  177677                          .WORD   65471.
    118 065356  177577                          .WORD   65407.
    119 065360  177377                          .WORD   65279.
    120 065362  176777                          .WORD   65023.
    121 065364  175777                          .WORD   64511.
    122 065366  173777                          .WORD   63487.
    123 065370  167777                          .WORD   61439.
    124 065372  157777                          .WORD   57343.
    125 065374  137777                          .WORD   49151.
    126 065376  077777                          .WORD   32767.
    127 065400  077777                          .WORD   32767.
    128 065402  137777                          .WORD   49151.
    129 065404  157777                          .WORD   57343.
    130 065406  167777                          .WORD   61439.
    131 065410  173777                          .WORD   63487.
    132 065412  175777                          .WORD   64511.
    133 065414  176777                          .WORD   65023.
    134 065416  177377                          .WORD   65279.
    135 065420  177577                          .WORD   65407.
    136 065422  177677                          .WORD   65471.
    137 065424  177737                          .WORD   65503.
    138 065426  177757                          .WORD   65519.
    139 065430  177767                          .WORD   65527.
    140 065432  177773                          .WORD   65531.
    141 065434  177775                          .WORD   65533.
    142 065436  177776                          .WORD   65534.
    143 065440  177777                          .WORD   65535.
    144 065442                          ENRGDT:
```

```
                                        .SBTTL  ERROR MESSAGE TABLE
                                        
065442  072102  000000          EMT1:   .WORD   EMS1,0
065446  072151  072166  000000  EMT2:   .WORD   EMS2,EMS3,0
065454  072151  072231  000000  EMT3:   .WORD   EMS2,EMS4,0
065462  072274  072324  000000  EMT4:   .WORD   EMS5,EMS6,0
065470  072274  072436  000000  EMT5:   .WORD   EMS5,EMS10,0
065476  077070  074317  000000  EMT6:   .WORD   EMS167,EMS64,0
065504  075065  077115  000000  EMT7:   .WORD   EMS110,EMS170,0
065512  072371  000000          EMT10:  .WORD   EMS7,0
065516  072436  000000          EMT11:  .WORD   EMS10,0
065522  072500  072511  000000  EMT12:  .WORD   EMS11,EMS12,0
065530  072552  072563  072574  EMT13:  .WORD   EMS13,EMS14,EMS15,EMS16,0
065542  072646  074317  000000  EMT14:  .WORD   EMS17,EMS64,0
065550  072500  072731  000000  EMT15:  .WORD   EMS11,EMS21,0
065556  072500  072754  073103  EMT16:  .WORD   EMS11,EMS22,EMS27,0
065566  072500  072770  073114  EMT17:  .WORD   EMS11,EMS23,EMS30,0
065576  072500  073016  073114  EMT20:  .WORD   EMS11,EMS24,EMS30,0
065606  072500  073045  073103  EMT21:  .WORD   EMS11,EMS25,EMS27,0
065616  072500  073062  073103  EMT22:  .WORD   EMS11,EMS26,EMS27,0
065626  072500  073124  073114  EMT23:  .WORD   EMS11,EMS31,EMS30,0
065636  072500  073153  073114  EMT24:  .WORD   EMS11,EMS32,EMS30,0
065646  072500  073202  073114  EMT25:  .WORD   EMS11,EMS33,EMS30,0
065656  072500  073230  073114  EMT26:  .WORD   EMS11,EMS34,EMS30,0
065666  072500  073301  073114  EMT27:  .WORD   EMS11,EMS35,EMS30,0
065676  072500  073330  073114  EMT30:  .WORD   EMS11,EMS36,EMS30,0
065706  072500  073357  073114  EMT31:  .WORD   EMS11,EMS37,EMS30,0
065716  072500  073405  073114  EMT32:  .WORD   EMS11,EMS40,EMS30,0
065726  072500  073434  073114  EMT33:  .WORD   EMS11,EMS41,EMS30,0
065736  072500  073462  073114  EMT34:  .WORD   EMS11,EMS42,EMS30,0
065746  072500  073511  073114  EMT35:  .WORD   EMS11,EMS43,EMS30,0
065756  072500  073540  073114  EMT36:  .WORD   EMS11,EMS44,EMS30,0
065766  072500  073613  073114  EMT37:  .WORD   EMS11,EMS45,EMS30,0
065776  074403  072706  000000  EMT40:  .WORD   EMS66,EMS20,0
066004  074571  076271  074577  EMT41:  .WORD   EMS75,EMS141,EMS76,0
066014  076362  076372  074525  EMT42:  .WORD   EMS144,EMS145,EMS72,EMS76,0
066026  073705  074023  074577  EMT43:  .WORD   EMS47,EMS53,EMS76,0
066036  074630  074023  074577  EMT44:  .WORD   EMS77,EMS53,EMS76,0
066046  074656  074023  074577  EMT45:  .WORD   EMS100,EMS53,EMS76,0
066056  074704  074023  074577  EMT46:  .WORD   EMS101,EMS53,EMS76,0
066066  074335  074317  000000  EMT47:  .WORD   EMS65,EMS64,0
066074  072552  072574  074271  EMT50:  .WORD   EMS13,EMS15,EMS63,0
066104  072500  073656  073114  EMT51:  .WORD   EMS11,EMS46,EMS30,EMS67,0
066116  073705  074023  074453  EMT52:  .WORD   EMS47,EMS53,EMS67,EMS115,EMS140,EMS141,0
066134  073705  074023  074453  EMT53:  .WORD   EMS47,EMS53,EMS67,EMS115,EMS141,EMS164,0
066152  073734  074023  074453  EMT54:  .WORD   EMS50,EMS53,EMS67,0
066162  076317  076334  074023  EMT55:  .WORD   EMS142,EMS143,EMS53,EMS67,0
066174  073763  074525  074453  EMT56:  .WORD   EMS51,EMS72,EMS67,EMS115,EMS50,EMS70,0
066212  077070  074535  074453  EMT57:  .WORD   EMS167,EMS73,EMS67,0
066222  074106  074453  075265  EMT60:  .WORD   EMS56,EMS67,EMS115,EMS150,EMS152,EMS70,0
066240  074512  074106  074453  EMT61:  .WORD   EMS71,EMS56,EMS67,EMS115,EMS150,EMS152,EMS72,0
066260  076250  074453  075265  EMT62:  .WORD   EMS140,EMS67,EMS115,EMS47,EMS70,0
066274  100270  100313  072706  EMT63:  .WORD   EMS225,EMS226,EMS20,0
066304  076455  076520  074500  EMT64:  .WORD   EMS150,EMS152,EMS70,EMS115,EMS56,EMS73,EMS67,0
066324  074011  077515  077676  EMT65:  .WORD   EMS52,EMS205,EMS214,EMS206,EMS115,EMS51,EMS72,0
066344  077027  074761  074525  EMT66:  .WORD   EMS165,EMS103,EMS72,EMS124,0
066356  077027  074761  074525  EMT67:  .WORD   EMS165,EMS103,EMS72,EMS171,0
```

ERROR MESSAGE TABLE

```
 58 066370  073656  072706  076722  EMT70:   .WORD   EMS46,EMS20,EMS163,0
 59 066400  074512  074704  076722  EMT71:   .WORD   EMS71,EMS101,EMS163,0
 60 066410  073705  074525  076722  EMT72:   .WORD   EMS47,EMS72,EMS163,EMS115,EMS140,EMS141,0
 61 066426  073705  074525  076722  EMT73:   .WORD   EMS47,EMS72,EMS163,EMS115,EMS141,EMS72,0
 62 066444  074106  074023  076722  EMT74:   .WORD   EMS56,EMS53,EMS163,0
 63 066454  074512  074106  076722  EMT75:   .WORD   EMS71,EMS56,EMS163,EMS115,EMS150,EMS152,EMS72,0
 64 066474  073734  074023  076722  EMT76:   .WORD   EMS50,EMS53,EMS163,0
 65 066504  076317  076334  074023  EMT77:   .WORD   EMS142,EMS143,EMS53,EMS163,0
 66 066516  074571  076271  076722  EMT100:  .WORD   EMS75,EMS141,EMS163,EMS115,EMS47,EMS70,0
 67 066534  074571  076455  076722  EMT101:  .WORD   EMS75,EMS150,EMS163,EMS115,EMS56,EMS73,0
 68 066552  077070  074535  076722  EMT102:  .WORD   EMS167,EMS73,EMS163,0
 69 066562  076440  076474  074552  EMT103:  .WORD   EMS147,EMS151,EMS74,EMS163,0
 70 066574  073763  074552  076722  EMT104:  .WORD   EMS51,EMS74,EMS163,EMS115,EMS50,EMS70,0
 71 066612  077027  074656  076722  EMT105:  .WORD   EMS165,EMS100,EMS163,0
 72 066622  077027  074630  076722  EMT106:  .WORD   EMS165,EMS77,EMS163,0
 73 066632  076362  076372  074023  EMT107:  .WORD   EMS144,EMS145,EMS53,EMS163,EMS115,EMS143,EMS70,0
 74 066652  075065  075125  075270  EMT110:  .WORD   EMS110,EMS112,EMS116,EMS111,0
 75 066664  075211  072231  000000  EMT111:  .WORD   EMS113,EMS4,0
 76 066672  075211  072166  000000  EMT112:  .WORD   EMS113,EMS3,0
 77 066700  075065  075265  075270  EMT113:  .WORD   EMS110,EMS115,EMS116,EMS117,EMS114,0
 78 066714  000000                  EMT114:  .WORD
 79 066716  075342  076002  076026  EMT115:  .WORD   EMS121,EMS132,EMS133,0
 80 066726  075405  076002  076026  EMT116:  .WORD   EMS122,EMS132,EMS133,0
 81 066736  075442  076002  076026  EMT117:  .WORD   EMS123,EMS132,EMS133,0
 82 066746  075505  076002  076026  EMT120:  .WORD   EMS124,EMS132,EMS133,0
 83 066756  075537  076002  076026  EMT121:  .WORD   EMS125,EMS132,EMS133,0
 84 066766  075602  076002  076026  EMT122:  .WORD   EMS126,EMS132,EMS133,0
 85 066776  076213  076002  076026  EMT123:  .WORD   EMS137,EMS132,EMS133,0
 86 067006  075704  076002  076026  EMT124:  .WORD   EMS130,EMS132,EMS133,0
 87 067016  075742  076002  076026  EMT125:  .WORD   EMS131,EMS132,EMS133,0
 88 067026  075342  076002  076051  EMT126:  .WORD   EMS121,EMS132,EMS134,EMS123,0
 89 067040  075405  076002  076051  EMT127:  .WORD   EMS122,EMS132,EMS134,EMS123,0
 90 067052  075442  076002  076051  EMT130:  .WORD   EMS123,EMS132,EMS134,EMS123,0
 91 067064  075505  076002  076051  EMT131:  .WORD   EMS124,EMS132,EMS134,EMS123,0
 92 067076  075537  076002  076051  EMT132:  .WORD   EMS125,EMS132,EMS134,EMS123,0
 93 067110  075602  076002  076051  EMT133:  .WORD   EMS126,EMS132,EMS134,EMS123,0
 94 067122  076213  076002  076051  EMT134:  .WORD   EMS137,EMS132,EMS134,EMS123,0
 95 067134  075704  076002  076051  EMT135:  .WORD   EMS130,EMS132,EMS134,EMS123,0
 96 067146  075742  076002  076051  EMT136:  .WORD   EMS131,EMS132,EMS134,EMS123,0
 97 067160  075342  076002  076113  EMT137:  .WORD   EMS121,EMS132,EMS135,0
 98 067170  075442  076002  076113  EMT140:  .WORD   EMS123,EMS132,EMS135,0
 99 067200  075342  076002  076166  EMT141:  .WORD   EMS121,EMS132,EMS136,0
100 067210  076213  076002  076166  EMT142:  .WORD   EMS137,EMS132,EMS136,0
101 067220  075505  076002  076166  EMT143:  .WORD   EMS124,EMS132,EMS136,0
102 067230  075537  076002  076166  EMT144:  .WORD   EMS125,EMS132,EMS136,0
103 067240  075602  076002  076166  EMT145:  .WORD   EMS126,EMS132,EMS136,0
104 067250  075742  076002  076166  EMT146:  .WORD   EMS131,EMS132,EMS136,0
105 067260  077144  076002  076166  EMT147:  .WORD   EMS171,EMS132,EMS136,0
106 067270  075704  076002  076166  EMT150:  .WORD   EMS130,EMS132,EMS136,0
107 067300  076250  075265  076271  EMT151:  .WORD   EMS140,EMS115,EMS141,EMS70,0
108 067312  076317  075265  076334  EMT152:  .WORD   EMS142,EMS115,EMS143,EMS72,0
109 067324  076362  076372  076421  EMT153:  .WORD   EMS144,EMS145,EMS146,EMS115,EMS143,EMS72,0
110 067342  076362  076372  072706  EMT154:  .WORD   EMS144,EMS145,EMS20,EMS115,EMS143,EMS70,0
111 067360  076455  076520  076566  EMT155:  .WORD   EMS150,EMS152,EMS154,EMS153,0
112 067372  076440  076474  076566  EMT156:  .WORD   EMS147,EMS151,EMS154,EMS155,0
113 067404  076440  076474  076622  EMT157:  .WORD   EMS147,EMS151,EMS156,EMS157,0
114 067416  076672  076622  076655  EMT160:  .WORD   EMS161,EMS156,EMS160,0
```

```
    115 067426  073045  073103  076622  EMT161: .WORD   EMS25,EMS27,EMS156,EMS160,0
    116 067440  073062  073103  076622  EMT162: .WORD   EMS26,EMS27,EMS156,EMS160,0
    117 067452  073705  076722  076250  EMT163: .WORD   EMS47,EMS163,EMS140,0
    118 067462  073705  072706  000000  EMT164: .WORD   EMS47,EMS20,0
    119 067470  074106  072706  000000  EMT165: .WORD   EMS56,EMS20,0
    120 067476  073656  072706  000000  EMT166: .WORD   EMS46,EMS20,0
    121 067504  100216  072706  000000  EMT167: .WORD   EMS224,EMS20,0
    122 067512  077454  076271  073114  EMT170: .WORD   EMS203,EMS141,EMS30,EMS202,0
    123 067524  077070  076566  076640  EMT171: .WORD   EMS167,EMS154,EMS157,0
    124 067534  077070  076566  076602  EMT172: .WORD   EMS167,EMS154,EMS155,0
    125 067544  077144  076002  076026  EMT173: .WORD   EMS171,EMS132,EMS133,0
    126 067554  077144  076002  076051  EMT174: .WORD   EMS171,EMS132,EMS134,EMS123,0
    127 067566  075217  077317  000000  EMT175: .WORD   EMS113,EMS177,0
    128 067574  077341  077356  000000  EMT176: .WORD   EMS200,EMS201,0
    129 067602  000000                  EMT177: .WORD
    130 067604  077454  073763  073114  EMT200: .WORD   EMS203,EMS51,EMS30,EMS202,0
    131 067616  077454  077467  073114  EMT201: .WORD   EMS203,EMS204,EMS30,EMS202,0
    132 067630  077454  073734  073114  EMT202: .WORD   EMS203,EMS50,EMS30,EMS202,0
    133 067642  077454  076334  073114  EMT203: .WORD   EMS203,EMS143,EMS30,EMS202,0
    134 067654  076455  074552  077424  EMT204: .WORD   EMS150,EMS74,EMS202,EMS115,EMS152,EMS72,0
    135 067672  073734  074761  074525  EMT205: .WORD   EMS50,EMS103,EMS72,0
    136 067702  074770  074535  077424  EMT206: .WORD   EMS104,EMS73,EMS202,0
    137 067712  074571  076271  075265  EMT207: .WORD   EMS75,EMS141,EMS115,EMS140,0
    138 067724  074571  076455  000000  EMT210: .WORD   EMS75,EMS150,0
    139 067732  073763  074525  075265  EMT211: .WORD   EMS51,EMS72,EMS115,EMS50,EMS70,0
    140 067746  076317  074023  075265  EMT212: .WORD   EMS142,EMS53,EMS115,EMS143,EMS72,0
    141 067762  073734  074761  074023  EMT213: .WORD   EMS50,EMS103,EMS53,0
    142 067772  074011  077515  077043  EMT214: .WORD   EMS52,EMS205,EMS166,EMS206,EMS115,EMS51,EMS72,0
    143 070012  074011  075320  074106  EMT215: .WORD   EMS52,EMS117,EMS56,EMS163,0
    144 070024  074106  073114  074317  EMT216: .WORD   EMS56,EMS30,EMS64,0
    145 070034  073656  073114  074317  EMT217: .WORD   EMS46,EMS30,EMS64,0
    146 070044  073124  073114  074317  EMT220: .WORD   EMS31,EMS30,EMS64,0
    147 070054  073705  073114  074317  EMT221: .WORD   EMS47,EMS30,EMS64,0
    148 070064  074011  075320  074630  EMT222: .WORD   EMS52,EMS117,EMS77,0
    149 070074  074011  075320  074271  EMT223: .WORD   EMS52,EMS117,EMS63,0
    150 070104  074011  075320  100270  EMT224: .WORD   EMS52,EMS117,EMS225,EMS115,EMS226,0
    151 070120  100270  100342  100353  EMT225: .WORD   EMS225,EMS227,EMS230,EMS115,EMS156,EMS231,EMS57,0
    152 070140  072500  100353  073114  EMT226: .WORD   EMS11,EMS230,EMS30,0
    153 070150  100270  100313  075265  EMT227: .WORD   EMS225,EMS226,EMS115,EMS230,EMS72,0
    154 070164  000000                  EMT230: .WORD
    155 070166  000000                  EMT231: .WORD
    156 070170  000000                  EMT232: .WORD
    157 070172  000000                  EMT233: .WORD
    158 070174  000000                  EMT234: .WORD
    159 070176  000000                  EMT235: .WORD
    160 070200  000000                  EMT236: .WORD
    161 070202  000000                  EMT237: .WORD
    162 070204  000000                  EMT240: .WORD
    163 070206  000000                  EMT241: .WORD
    164 070210  000000                  EMT242: .WORD
    165 070212  000000                  EMT243: .WORD
    166 070214  000000                  EMT244: .WORD
    167 070216  000000                  EMT245: .WORD
    168 070220  077070  076002  077554  EMT246: .WORD   EMS167,EMS132,EMS207,0
    169 070230  077070  076002  077601  EMT247: .WORD   EMS167,EMS132,EMS210,EMS125,0
    170 070242  077070  077612  077601  EMT250: .WORD   EMS167,EMS211,EMS210,EMS207,EMS206,0
    171 070256  077630  077653  000000  EMT251: .WORD   EMS212,EMS213,0
```

ERROR MESSAGE TABLE

```
    172 070264  077027  077630  000000  EMT252: .WORD   EMS165,EMS212,0
    173 070272  076440  076474  076622  EMT253: .WORD   EMS147,EMS151,EMS156,EMS210,EMS26,EMS27,0
    174 070310  077454  074704  073114  EMT254: .WORD   EMS203,EMS101,EMS30,0
    175 070320  077454  077070  073114  EMT255: .WORD   EMS203,EMS167,EMS30,0
    176 070330  077454  074656  073114  EMT256: .WORD   EMS203,EMS100,EMS30,0
    177 070340  072500  073656  073114  EMT257: .WORD   EMS11,EMS46,EMS30,EMS102,0
    178 070352  074011  075320  074106  EMT260: .WORD   EMS52,EMS117,EMS56,EMS102,0
    179 070364  074011  077515  100020  EMT261: .WORD   EMS52,EMS205,EMS220,EMS206,EMS115,EMS51,EMS72,0
    180 070404  074770  074535  077424  EMT262: .WORD   EMS104,EMS73,EMS202,0
    181 070414  073734  074023  074732  EMT263: .WORD   EMS50,EMS53,EMS102,0
    182 070424  074106  074023  074732  EMT264: .WORD   EMS56,EMS53,EMS102,EMS115,EMS150,EMS152,EMS70,0
    183 070444  074512  074106  074732  EMT265: .WORD   EMS71,EMS56,EMS102,EMS115,EMS150,EMS152,EMS72,0
    184 070464  076317  076334  074023  EMT266: .WORD   EMS142,EMS143,EMS53,EMS102,0
    185 070476  073734  076421  075265  EMT267: .WORD   EMS50,EMS146,EMS115,EMS52,EMS117,EMS46,0
    186 070514  073705  074023  074732  EMT270: .WORD   EMS47,EMS53,EMS102,EMS115,EMS140,0
    187 070530  073705  074023  074732  EMT271: .WORD   EMS47,EMS53,EMS102,EMS115,EMS141,EMS72,0
    188 070546  074571  076271  074732  EMT272: .WORD   EMS75,EMS141,EMS102,EMS115,EMS47,EMS73,0
    189 070564  073763  074552  074732  EMT273: .WORD   EMS51,EMS74,EMS102,EMS115,EMS50,EMS70,0
    190 070602  074271  074023  074163  EMT274: .WORD   EMS63,EMS53,EMS57,EMS115,EMS41,EMS146,0
    191 070620  075270  074023  073434  EMT275: .WORD   EMS116,EMS53,EMS41,EMS57,0
    192 070632  073705  074023  074163  EMT276: .WORD   EMS47,EMS53,EMS57,EMS115,EMS140,0
    193 070646  073705  074023  074163  EMT277: .WORD   EMS47,EMS53,EMS57,EMS115,EMS141,EMS72,0
    194 070664  074106  074023  074163  EMT300: .WORD   EMS56,EMS53,EMS57,EMS115,EMS150,EMS152,EMS70,0
    195 070704  074512  074106  074023  EMT301: .WORD   EMS71,EMS56,EMS53,EMS57,EMS115,EMS150,EMS152,EMS72,0
    196 070726  077027  074656  074761  EMT302: .WORD   EMS165,EMS100,EMS103,EMS57,0
    197 070740  077027  074704  074761  EMT303: .WORD   EMS165,EMS101,EMS103,EMS57,0
    198 070752  077027  074630  074761  EMT304: .WORD   EMS165,EMS77,EMS103,EMS57,0
    199 070764  073656  073114  074317  EMT305: .WORD   EMS46,EMS30,EMS64,EMS57,0
    200 070776  073734  074023  074163  EMT306: .WORD   EMS50,EMS53,EMS57,0
    201 071006  073734  076421  075265  EMT307: .WORD   EMS50,EMS146,EMS115,EMS52,EMS117,EMS46,EMS57,0
    202 071026  076317  076334  074023  EMT310: .WORD   EMS142,EMS143,EMS53,EMS57,0
    203 071040  074770  074761  074023  EMT311: .WORD   EMS104,EMS103,EMS53,EMS57,0
    204 071052  075017  074761  074023  EMT312: .WORD   EMS105,EMS103,EMS53,EMS57,0
    205 071064  076362  076372  074761  EMT313: .WORD   EMS144,EMS145,EMS103,EMS57,EMS115,EMS143,EMS70,0
    206 071104  073462  074761  074023  EMT314: .WORD   EMS42,EMS103,EMS53,EMS57,0
    207 071116  073124  074761  074023  EMT315: .WORD   EMS31,EMS103,EMS53,EMS57,0
    208 071130  074512  073124  074761  EMT316: .WORD   EMS71,EMS31,EMS103,EMS57,0
    209 071142  073511  074761  074163  EMT317: .WORD   EMS43,EMS103,EMS57,0
    210 071152  073613  074761  074163  EMT320: .WORD   EMS45,EMS103,EMS57,0
    211 071162  073540  074761  074163  EMT321: .WORD   EMS44,EMS103,EMS57,0
    212 071172  075046  072706  000000  EMT322: .WORD   EMS106,EMS20,0
    213 071200  073330  074761  074163  EMT323: .WORD   EMS36,EMS103,EMS57,0
    214 071210  077217  073330  074761  EMT324: .WORD   EMS173,EMS36,EMS103,EMS57,0
    215 071222  077177  073330  074761  EMT325: .WORD   EMS172,EMS36,EMS103,EMS57,0
    216 071234  072552  077234  072574  EMT326: .WORD   EMS13,EMS174,EMS15,EMS35,EMS53,EMS175,0
    217 071252  076440  076474  074552  EMT327: .WORD   EMS147,EMS151,EMS74,EMS175,0
    218 071264  074403  074023  077242  EMT330: .WORD   EMS66,EMS53,EMS175,0
    219 071274  073202  074761  074023  EMT331: .WORD   EMS33,EMS103,EMS53,EMS175,0
    220 071306  073405  074761  074023  EMT332: .WORD   EMS40,EMS103,EMS53,EMS57,0
    221 071320  073763  074552  074163  EMT333: .WORD   EMS51,EMS74,EMS57,EMS115,EMS50,EMS70,0
    222 071336  074571  076271  074163  EMT334: .WORD   EMS75,EMS141,EMS57,EMS115,EMS47,EMS73,0
    223 071354  074571  076455  076520  EMT335: .WORD   EMS75,EMS150,EMS152,EMS57,EMS115,EMS56,EMS73,0
    224 071374  074211  074224  074253  EMT336: .WORD   EMS60,EMS61,EMS62,0
    225 071404  075270  075320  073230  EMT337: .WORD   EMS116,EMS117,EMS34,0
    226 071414  073230  074023  074035  EMT340: .WORD   EMS34,EMS53,EMS54,EMS111,0
    227 071426  074057  073230  000000  EMT341: .WORD   EMS55,EMS34,0
    228 071434  074011  075320  074106  EMT342: .WORD   EMS52,EMS117,EMS56,EMS57,0
```

ERROR MESSAGE TABLE

```
    229 071446  074011  075320  073613  EMT343: .WORD   EMS52,EMS117,EMS45,EMS57,0
    230 071460  074011  075320  073540  EMT344: .WORD   EMS52,EMS117,EMS44,EMS57,0
    231 071472  074011  075320  100040  EMT345: .WORD   EMS52,EMS117,EMS221,0
    232 071502  075046  072706  075265  EMT346: .WORD   EMS106,EMS20,EMS115,EMS223,EMS72,0
    233 071516  074011  077515  100110  EMT347: .WORD   EMS52,EMS205,EMS222,EMS206,0
    234 071530  074571  076455  074732  EMT350: .WORD   EMS75,EMS150,EMS102,EMS115,EMS56,EMS73,0
    235 071546  077070  074535  074732  EMT351: .WORD   EMS167,EMS73,EMS102,0
    236 071556  077714  000000          EMT352: .WORD   EMS215,0
    237 071562  077765  077454  077735  EMT353: .WORD   EMS217,EMS203,EMS216,0
    238 071572  100040  072706  000000  EMT354: .WORD   EMS221,EMS20,0
```

ERROR MESSAGE TABLE

```
      1 071600  100445  101251  101326  EHT1:    .WORD   EH1,STSH1,STSH2,STSH4,0
      2 071612  101251  101326  101453  EHT2:    .WORD   STSH1,STSH2,STSH4,0
      3
      4 071622  100464  000000          EHT110:  .WORD   EH110,0
      5 071626  100473  000000          EHT111:  .WORD   EH111,0
      6
      7 071632  100512  000000          EHT114:  .WORD   EH114,0
      8 071636  100541  101251  101326  EHT223:  .WORD   EH223,STSH1,STSH2,STSH4,0
      9 071650  100567  101251  101326  EHT256:  .WORD   EH256,STSH1,STSH2,STSH4,0
     10
     11 071662  100643  101251  101326  EHT336:  .WORD   EH336,STSH1,STSH2,STSH4,0
     12 071674  100702  101251  101326  EHT337:  .WORD   EH337,STSH1,STSH2,STSH4,0
     13 071706  101037  101251  101326  EHT344:  .WORD   EH344,STSH1,STSH2,STSH4,0
     14
     15 071720  101175  000000          EHT353:  .WORD   EH353,0
```

ERROR MESSAGE TABLE

```
      1 071724  101512  101606  101624  EDT1:    .WORD   ED1,STSD1,STSD2,STSD4
      2 071734  101606  101624  101656  EDT2:    .WORD   STSD1,STSD2,STSD4
      3
      4 071742  101520                  EDT110:  .WORD   ED110
      5 071744  101524                  EDT111:  .WORD   ED111
      6
      7 071746  101532                  EDT114:  .WORD   ED114
      8 071750  101542  101606  101624  EDT223:  .WORD   ED223,STSD1,STSD2,STSD4
      9
     10 071760  101552  101606  101624  EDT336:  .WORD   ED336,STSD1,STSD2,STSD4
     11 071770  101564  101606  101624  EDT337:  .WORD   ED337,STSD1,STSD2,STSD4
     12 072000  101564  101606  101624  EDT344:  .WORD   ED337,STSD1,STSD2,STSD4,0
     13
     14 072012  101576                  EDT353:  .WORD   ED353
```

ERROR MESSAGE TABLE

```
      1 072014  101671  101707  101707  EFT1:    .WORD   EF111,STSF,STSF,STSF
      2 072024  101707  101707  101707  EFT2:    .WORD   STSF,STSF,STSF
      3
      4 072032  101670                  EFT110:  .WORD   EF110
      5 072034  101671                  EFT111:  .WORD   EF111
      6
      7 072036  101673                  EFT114:  .WORD   EF114
      8 072040  101673  101707  101707  EFT223:  .WORD   EF114,STSF,STSF,STSF
      9
     10 072050  101676  101707  101707  EFT336:  .WORD   EF336,STSF,STSF,STSF
     11 072060  101676  101707  101707  EFT337:  .WORD   EF336,STSF,STSF,STSF
     12 072070  101676  101707  101707  EFT344:  .WORD   EF336,STSF,STSF,STSF
     13
     14 072100  101673                  EFT353:  .WORD   EF114
```

ERROR MESSAGE STRINGS

```
                                .SBTTL  ERROR MESSAGE STRINGS

072102  127  122  117  EMS1:   .ASCIZ  @WRONG UNIT SELECTED (RMCS2, BITS 0-2) @
072151  104  105  126  EMS2:   .ASCIZ  @DEVICE WENT @
072166  125  116  101  EMS3:   .ASCIZ  @UNAVAILABLE "DVA" (RMCS1, BIT 11) @
072231  116  117  116  EMS4:   .ASCIZ  @NONEXISTENT "NED" (RMCS2, BIT 12) @
072274  103  117  115  EMS5:   .ASCIZ  @COMMAND NOT COMPLETED, @
072324  103  117  116  EMS6:   .ASCIZ  @CONTROLLER NOT READY (RMCS1, BIT 7) @
072371  104  122  111  EMS7:   .ASCIZ  @DRIVE NOT READY "DRY" (RMDS, BIT 7) @
072436  107  117  040  EMS10:  .ASCIZ  @GO NOT RESET "GO" (RMCS1, BIT 0) @
072500  111  116  126  EMS11:  .ASCIZ  @INVALID @
072511  106  125  116  EMS12:  .ASCIZ  @FUNCTION CODE (RMCS1, BITS 1-5) @
072552  115  101  123  EMS13:  .ASCIZ  @MASSBUS @
072563  103  117  116  EMS14:  .ASCIZ  @CONTROL @
072574  102  125  123  EMS15:  .ASCIZ  @BUS PARITY ERROR @
072616  042  115  103  EMS16:  .ASCIZ  @"MCPE" (RMCS1, BIT 13) @
072646  124  122  101  EMS17:  .ASCIZ  @TRANSFER ERROR (RMCS1, BIT 14) @
072706  123  110  117  EMS20:  .ASCIZ  @SHOULD NOT BE SET @
072731  127  117  122  EMS21:  .ASCIZ  @WORD COUNT (RMWC) @
072754  102  125  123  EMS22:  .ASCIZ  @BUS (RMBA) @
072770  042  114  102  EMS23:  .ASCIZ  @"LBT" (RMDS, BIT 10) @
073016  042  101  117  EMS24:  .ASCIZ  @"AOE" (RMER1, BIT 09) @
073045  104  111  123  EMS25:  .ASCIZ  @DISK (RMDA) @
073062  103  131  114  EMS26:  .ASCIZ  @CYLINDER (RMDC) @
073103  101  104  104  EMS27:  .ASCIZ  @ADDRESS @
073114  123  124  101  EMS30:  .ASCIZ  @STATUS @
073124  042  127  114  EMS31:  .ASCIZ  @"WLE" (RMER1, BIT 11) @
073153  042  125  120  EMS32:  .ASCIZ  @"UPE" (RMCS2, BIT 13) @
073202  042  127  103  EMS33:  .ASCIZ  @"WCF" (RMER1, BIT 5) @
073230  127  122  111  EMS34:  .ASCIZ  @WRITE CHECK ERROR-"WCE" (RMCS2, BIT 14) @
073301  042  115  104  EMS35:  .ASCIZ  @"MDPE" (RMCS2, BIT 8) @
073330  042  104  103  EMS36:  .ASCIZ  @"DCK" (RMER1, BIT 15) @
073357  042  105  103  EMS37:  .ASCIZ  @"ECH" (RMER1, BIT 6) @
073405  042  104  114  EMS40:  .ASCIZ  @"DLT" (RMCS2, BIT 15) @
073434  042  115  130  EMS41:  .ASCIZ  @"MXF" (RMCS2, BIT 9) @
073462  042  104  124  EMS42:  .ASCIZ  @"DTE" (RMER1, BIT 12) @
073511  042  110  103  EMS43:  .ASCIZ  @"HCRC" (RMER1, BIT 8) @
073540  110  105  101  EMS44:  .ASCIZ  @HEADER COMPARE ERROR "HCE" (RMER1, BIT 7) @
073613  106  117  122  EMS45:  .ASCIZ  @FORMAT ERROR "FER" (RMER1, BIT 4) @
073656  042  111  101  EMS46:  .ASCIZ  @"IAE" (RMER1, BIT 10) @
073705  042  117  120  EMS47:  .ASCIZ  @"OPI" (RMER1, BIT 13) @
073734  042  123  113  EMS50:  .ASCIZ  @"SKI" (RMER2, BIT 14) @
073763  042  120  111  EMS51:  .ASCIZ  @"PIP" (RMDS, BIT 13) @
074011  124  110  105  EMS52:  .ASCIZ  @THE RM80 @
074023  104  105  124  EMS53:  .ASCIZ  @DETECTED @
074035  101  124  040  EMS54:  .ASCIZ  @AT AN UNEXPECTED @
074057  111  116  103  EMS55:  .ASCIZ  @INCORRECT DATA DURING @
074106  111  116  126  EMS56:  .ASCIZ  @INVALID COMMAND ERROR "IVC" (RMER2, BIT 12) @
074163  104  125  122  EMS57:  .ASCIZ  @DURING DATA TRANSFER @
074211  104  101  124  EMS60:  .ASCIZ  @DATA READ @
074224  104  117  105  EMS61:  .ASCIZ  @DOES NOT COMPARE WITH @
074253  104  101  124  EMS62:  .ASCIZ  @DATA WRITTEN @
074271  042  120  101  EMS63:  .ASCIZ  @"PAR" (RMER1, BIT 3) @
074317  111  123  040  EMS64:  .ASCIZ  @IS INCORRECT @
074335  103  117  115  EMS65:  .ASCIZ  @COMPOSITE ERROR "ERR" (RMDS, BIT 14) @
074403  104  101  124  EMS66:  .ASCIZ  @DATA PARITY ERROR "DPE" (RMER2, BIT 3) @
074453  104  125  122  EMS67:  .ASCIZ  @DURING SEEK COMMAND @
```

ERROR MESSAGE STRINGS

```
     58 074500      111      123      040  EMS70:  .ASCIZ  @IS RESET @
     59 074512      105      122      122  EMS71:  .ASCIZ  @ERRONEOUS @
     60 074525      111      123      040  EMS72:  .ASCIZ  @IS SET @
     61 074535      104      111      104  EMS73:  .ASCIZ  @DID NOT SET @
     62 074552      104      111      104  EMS74:  .ASCIZ  @DID NOT RESET @
     63 074571      114      117      123  EMS75:  .ASCIZ  @LOST @
     64 074577      104      125      122  EMS76:  .ASCIZ  @DURING PACK ACK COMMAND @
     65 074630      042      122      115  EMS77:  .ASCIZ  @'RMR'' (RMER1, BIT 2) @
     66 074656      042      111      114  EMS100: .ASCIZ  @''ILR'' (RMER1, BIT 1) @
     67 074704      042      111      114  EMS101: .ASCIZ  @''ILF'' (RMER1, BIT 0) @
     68 074732      104      125      122  EMS102: .ASCIZ  @DURING SEARCH COMMAND @
     69 074761      105      122      122  EMS103: .ASCIZ  @ERROR @
     70 074770      042      114      102  EMS104: .ASCIZ  @'LBC'' (RMER2, BIT 10) @
     71 075017      042      114      123  EMS105: .ASCIZ  @'LSC'' (RMER2, BIT 11) @
     72 075046      110      105      101  EMS106: .ASCIZ  @HEADER ERRORS @
     73 075065      102      125      123  EMS110: .ASCIZ  @BUS TIMEOUT (04 TRAP) @
     74 075114      101      104      104  EMS111: .ASCIZ  @ADDRESS @
     75 075125      127      110      105  EMS112: .ASCII  @WHEN READING/WRITING RH REGISTERS @
     76 075167      101      124      040          .ASCIZ  @AT THE FOLLOWING @
     77 075211      124      110      105  EMS113: .ASCIZ  @THE SELECTED DEVICE IS @
     78 075241      116      117      116  EMS114: .ASCIZ  @NONEXISTENT DEVICE @
     79 075265      015      012      000  EMS115: .ASCIZ  <CR><LF>
     80 075270      124      110      105  EMS116: .ASCIZ  @THE MASSBUS CONTROLLER @
     81 075320      106      101      111  EMS117: .ASCIZ  @FAILED TO DETECT @
     82 075342                          EMS120: ;NOT USED
     83 075342      103      117      116  EMS121: .ASCIZ  @CONTROL STATUS REGISTER 1, RMCS1, @
     84 075405      102      125      123  EMS122: .ASCIZ  @BUS ADDRESS REGISTER, RMBA, @
     85 075442      103      117      116  EMS123: .ASCIZ  @CONTROL STATUS REGISTER 2, RMCS2, @
     86 075505      105      122      122  EMS124: .ASCIZ  @ERROR REGISTER 1, RMER1, @
     87 075537      101      124      124  EMS125: .ASCIZ  @ATTENTION SUMMARY REGISTER, RMAS, @
     88 075602      115      101      111  EMS126: .ASCIZ  @MAINTENANCE REGISTER #1, RMMR #1, @
     89 075645      105      103      103  EMS127: .ASCIZ  @ECC POSITION REGISTER, RMEC1, @
     90 075704      105      103      103  EMS130: .ASCIZ  @ECC PATTERN REGISTER, RMEC2, @
     91 075742      115      101      111  EMS131: .ASCIZ  @MAINTENANCE REGISTER 2, RMMR2, @
     92 076002      116      117      124  EMS132: .ASCIZ  @NOT INITIALIZED BY @
     93 076026      125      116      111  EMS133: .ASCIZ  @UNIBUS INITIALIZE @
     94 076051      103      117      116  EMS134: .ASCIZ  @CONTROLLER CLEAR, I.E.  BIT 5 OF @
     95 076113      122      110      040  EMS135: .ASCIZ  @RH CONTROLLER ERROR CLEAR (RMCS1, BIT 14) @
     96 076166      104      122      111  EMS136: .ASCIZ  @DRIVE CLEAR COMMAND @
     97 076213      104      122      111  EMS137: .ASCIZ  @DRIVE STATUS REGISTER, RMDS @
     98 076250      115      105      104  EMS140: .ASCIZ  @MEDIUM OFF LINE @
     99 076271      042      115      117  EMS141: .ASCIZ  @'MOL'' (RMDS, BIT 12) @
    100 076317      104      122      111  EMS142: .ASCIZ  @DRIVE FAULT @
    101 076334      042      104      126  EMS143: .ASCIZ  @'DVC'' (RMER2, BIT 7) @
    102 076362      125      116      123  EMS144: .ASCIZ  @UNSAFE @
    103 076372      042      125      116  EMS145: .ASCIZ  @'UNS'' (RMER1, BIT 14) @
    104 076421      123      110      117  EMS146: .ASCIZ  @SHOULD BE SET @
    105 076440      117      106      106  EMS147: .ASCIZ  @OFFSET MODE @
    106 076455      040      126      117  EMS150: .ASCIZ   @ VOLUME VALID @
    107 076474      042      117      115  EMS151: .ASCIZ  @'OM'' (RMDS, BIT 0) @
    108 076520      042      126      126  EMS152: .ASCIZ  @'VV'' (RMDS, BIT 6) @
    109 076544      120      101      103  EMS153: .ASCIZ  @PACK ACK COMMAND @
    110 076566      116      117      124  EMS154: .ASCIZ  @NOT SET BY @
    111 076602      117      106      106  EMS155: .ASCIZ  @OFFSET COMMAND @
    112 076622      116      117      124  EMS156: .ASCIZ  @NOT RESET BY @
    113 076640      122      124      103  EMS157: .ASCIZ  @RTC COMMAND @
    114 076655      122      111      120  EMS160: .ASCIZ  @RIP COMMAND @
```

ERROR MESSAGE STRINGS

```
    115 076672      117     106     106  EMS161: .ASCIZ  @OFFSET REGISTER (RMOF) @
    116 076722                           EMS162:         ;<UNUSED>
    117 076722      104     125     122  EMS163: .ASCIZ  @DURING RECALIBRATE @
    118 076746      111     123     040  EMS164: .ASCII  @IS INTERMITTENT OR DRIVE DIDNT DROP ON @
    119 077015      103     131     114          .ASCIZ  @CYLINDER @
    120 077027      125     116     105  EMS165: .ASCIZ  @UNEXPECTED @
    121 077043      122     105     103  EMS166: .ASCIZ  @RECALIBRATE COMMAND @
    122 077070      042     101     124  EMS167: .ASCIZ  @"ATA" (RMDS, BIT15) @
    123 077115      127     110     105  EMS170: .ASCIZ  @WHEN READING REGISTER @
    124 077144      105     122     122  EMS171: .ASCIZ  @ERROR REGISTER #2, RMER2, @
    125 077177      116     117     116  EMS172: .ASCIZ  @NONRECOVERABLE @
    126 077217      122     105     103  EMS173: .ASCIZ  @RECOVERABLE @
    127 077234      104     101     124  EMS174: .ASCIZ  @DATA @
    128 077242      104     125     122  EMS175: .ASCIZ  @DURING WRITE COMMAND @
    129 077270      042     117     120  EMS176: .ASCIZ  @"DPE" (RMER2, BIT 13) @
    130 077317      111     116     040  EMS177: .ASCIZ  @IN WRITE PROTECT @
    131 077341      103     101     116  EMS200: .ASCIZ  @CAN NOT SET @
    132 077356      104     111     101  EMS201: .ASCIZ  @DIAGNOSTIC MODE "DMD" (RMMR1, BIT 0) @
    133 077424      104     125     122  EMS202: .ASCIZ  @DURING DIAGNOSTIC MODE @
    134 077454      111     116     103  EMS203: .ASCIZ  @INCORRECT @
    135 077467      042     127     122  EMS204: .ASCIZ  @"WRL" (RMDS, BIT 11) @
    136 077515      105     130     105  EMS205: .ASCIZ  @EXECUTED @
    137 077527      127     111     124  EMS206: .ASCIZ  @WITH COMP ERROR SET @
    138 077554      042     107     117  EMS207: .ASCIZ  @"GO" (RMCS1, BIT 0) @
    139 077601      127     122     111  EMS210: .ASCIZ  @WRITING @
    140 077612      127     101     123  EMS211: .ASCIZ  @WAS RESET BY @
    141 077630      120     122     117  EMS212: .ASCIZ  @PROGRAM INTERRUPT @
    142 077653      127     101     123  EMS213: .ASCIZ  @WAS NOT GENERATED @
    143 077676      123     105     105  EMS214: .ASCIZ  @SEEK COMMAND @
    144 077714      120     122     117  EMS215: .ASCIZ  @PROGRAM TIMEOUT @
    145 077735      104     125     122  EMS216: .ASCIZ  @DURING LOOK AHEAD TEST @
    146 077765      114     117     117  EMS217: .ASCIZ  @LOOK AHEAD REGISTER,RMLA, @
    147 100020      123     105     101  EMS220: .ASCIZ  @SEARCH COMMAND @
    148 100040      102     101     104  EMS221: .ASCIZ  @BAD SECTOR ERROR "BSE" (RMER2, BIT 15) @
    149 100110      101     040     104  EMS222: .ASCIZ  @A DATA TRANSFER COMMAND @
    150 100141      110     105     101  EMS223: .ASCIZ  @HEADER COMPARE INHIBIT "HCI" (RMOF, BIT 10) @
    151 100216      116     117     116  EMS224: .ASCIZ  @NONEXISTENT MEMORY "NEM" (RMCS2, BIT 11) @
    152 100270      123     113     111  EMS225: .ASCIZ  @SKIP SECTOR ERROR @
    153 100313      042     123     123  EMS226: .ASCIZ  @"SSE" (RMER2, BIT 05) @
    154 100342      111     116     110  EMS227: .ASCIZ  @INHIBIT @
    155 100353      042     123     123  EMS230: .ASCIZ  @"SSEI" (RMOF, BIT 09) @
    156 100402      105     116     104  EMS231: .ASCIZ  @END OF TRACK @
    157 100420      101     106     124  EMS232: .ASCIZ  @AFTER DATA TRANSFER @
```

ERROR MESSAGE STRINGS

```
      1 100445      105      130      120  EH1:     .ASCIZ  @EXPCTD  RECEVD@
      2 100464      102      125      123  EH110:   .ASCIZ  @BUSADR@
      3 100473      040      122      115  EH111:   .ASCIZ  @ RMCS2   RMCS1@
      4
      5 100512      122      105      103  EH114:   .ASCIZ  @RECEVD  SNGPRT  DULPRT@
      6 100541      105      130      120  EH223:   .ASCIZ  @EXPCTD  RECEVD   DATA@
      7 100567      105      130      120  EH256:   .ASCII  @EXPCTD  RECEVD  RGSTR@<CRLF>
      8 100615      123      124      101           .ASCIZ  @STATUS  STATUS  INDEX@
      9
     10 100643      107      104      101  EH336:   .ASCIZ  @GDADRS  GDDATA  BDADRS  BDDATA@
     11 100702      122      115      103  EH337:   .ASCII  @RMCS2   STATUS  FAILING   DATA@<CRLF>
     12 100741      137      137      137           .ASCII  @                              @<CRLF>
     13 101000      105      130      120           .ASCIZ  @EXPCTD--RECEVD  --BIT---ADRESS@
     14
     15 101037      122      115      105  EH344:   .ASCII  @RMER1   STATUS  HEADER  FAILING@<CRLF>
     16 101077      137      137      137           .ASCII  @                WORD     BIT@<CRLF>
     17 101135      105      130      120           .ASCIZ  @EXPCTD--RECEVD  NUMBER  POSITON@
     18 101175      105      130      120  EH353:   .ASCII  @EXPCTD  RECEVD@<CRLF>
     19 101214      074      103      122           .ASCIZ  @<CRLF> RMLA    RMLA    RMOF @
     20
     21 101251      040      122      115  STSH1:   .ASCII  @ RMCS1  RMCS2   RMDS    RMER1   RMER2@
     22 101316      040      040      040           .ASCIZ  @   RMAS@
     23 101326      040      122      115  STSH2:   .ASCII  @ RMWC    RMBA    RMDA    RMOF    RMDC@
     24 101373      040      040      040           .ASCIZ  @    RMEC1   RMEC2@
     25 101415      040      122      115  STSH3:   .ASCIZ  @ RMDA    RMDC    RMOF    RMLA@
     26 101453      040      122      115  STSH4:   .ASCIZ  @ RMMR1   RMMR2   RMDT    RMSN@
     27                                    .EVEN
```

ERROR MESSAGE STRINGS

```
      1 101512  001140  001142  000000  ED1:    .WORD   $GDDAT,$BDDAT,0
      2 101520  001276  000000          ED110:  .WORD   $BASE,0
      3 101524  001174  001176  000000  ED111:  .WORD   $TMP0,$TMP1,0
      4
      5 101532  001364  001176  001200  ED114:  .WORD   RMDTI,$TMP1,$TMP2,0
      6 101542  001140  001142  001174  ED223:  .WORD   $GDDAT,$BDDAT,$TMP0,0
      7
      8 101552  001134  001140  001136  ED336:  .WORD   $GDADR,$GDDAT,$BDADR,$BDDAT,0
      9
     10 101564  001140  001142  001174  ED337:  .WORD   $GDDAT,$BDDAT,$TMP0,$TMP1,0
     11 101576  001140  001142  001444  ED353:  .WORD   $GDDAT,$BDDAT,RMOF0,0
     12
     13 101606  001336  001346  001350  STSD1:  .WORD   RMCS1I,RMCS2I,RMDSI,RMER1I,RMER2I,RMASI,0
     14 101624  001340  001342  001344  STSD2:  .WORD   RMWCI,RMBAI,RMDAI,RMOFI,RMDCI,RMEC1I
     15 101640  001404  000000          .WORD   RMEC2I,0
     16 101644  001344  001372  001370  STSD3:  .WORD   RMDAI,RMDCI,RMOFI,RMLAI,0
     17 101656  001362  001376  001364  STSD4:  .WORD   RMMR1I,RMMR2I,RMDTI,RMSNI,0
```

ERROR MESSAGE STRINGS

```
      1 101670  000                     EF110:  .BYTE   0
      2 101671  000   000               EF111:  .BYTE   0,0
      3 101673  000   000   000         EF114:  .BYTE   0,0,0
      4 101676  000   000   000         EF336:  .BYTE   0,0,0,0
      5 101702  000   000   000         EF337:  .BYTE   0,0,0,0,0
      6
      7 101707  000   000   000         STSF:   .BYTE   0,0,0,0,0,0,0
      8                                 .EVEN
```

ERROR MESSAGE STRINGS

```
                                        ;STORAGE FOR GENERAL DATA TRANSFERRS
                                BUFFER:
                                BUFONE: .BLKW   258.
                                BUFTWO: .BLKW   258.

                                        ;STORAGE FOR MANUFACTURES BAD SECTOR FILE(DEC144)
000000  000000                  MFGFIL: .WORD   0,0              ;2 HEADER WORDS
                                        .BLKW   256.            ;256. WORDS OF DATA
177777                                  .WORD   -1              ;TERMINATOR IF FILE IS FULL

                                        ;STORAGE FOR USERS BAD SECTOR FILE(DEC144)
000000  000000                  USRFIL: .WORD   0,0              ;2 HEADER WORDS
                                        .BLKW   256.            ;256. WORDS OF DATA
177777                                  .WORD   -1              ;TERMINATOR IF FILE IS FULL

                                        ;STORAGE FOR SKIP SECTOR FILE
000000  000000                  SSFIL:  .WORD   0,0              ;2 HEADER WORDS
                                        .BLKW   28.             ;2 CYLINDERS OF SKIP SECTOR ENTRIES
177777                                  .WORD   -1              ;TERMINATOR

101716                          .=BUFFER

                                HELP:
                                .ASCII  <CRLF>
200                             .ASCII  <CRLF>
114     111     123             .ASCII  @LIST OF TESTS@<CRLF>
055     055     055             .ASCII  @-------------@<CRLF>
124     061     011             .ASCII  @T1     CONTROLLER ACCESS TEST@<CRLF>
124     062     011             .ASCII  @T2     FORMAT ZEROS@<CRLF>
124     063     011             .ASCII  @T3     ZERO FILL TEST@<CRLF>
124     064     011             .ASCII  @T4     FORMAT CHECK ZEROS@<CRLF>
124     065     011             .ASCII  @T5     FORMAT CHECK ZEROS W/ WCE ERROR@<CRLF>
124     066     011             .ASCII  @T6     FORMAT ONES@<CRLF>
124     067     011             .ASCII  @T7     FORMAT CHECK ONES@<CRLF>
124     061     060             .ASCII  @T10    FORMAT CHECK ONES W/ WCE ERRORS@<CRLF>
124     061     061             .ASCII  @T11    FORMAT MULTIPLE SECTORS@<CRLF>
124     061     062             .ASCII  @T12    READ HEADER & DATA W/ HEAD SWITCHING@<CRLF>
124     061     063             .ASCII  @T13    READ HEADER & DATA W/ MID TRANSFER SEEK@<CRLF>
124     061     064             .ASCII  @T14    FORMAT W/ IMPLIED SEEK@<CRLF>
124     061     065             .ASCII  @T15    FORMAT EACH SECTOR ADDRESS@<CRLF>
124     061     066             .ASCII  @T16    FORMAT EACH TRACK ADDRESS@<CRLF>
124     061     067             .ASCII  @T17    READ HEADER & DATA IN LAST SECTOR@<CRLF>
124     062     060             .ASCII  @T20    READ HEADER & DATA W/ AOE ERROR@<CRLF>
124     062     061             .ASCII  @T21    READ INVALID SECTOR ADDRESS@<CRLF>
124     062     062             .ASCII  @T22    READ INVALID TRACK ADDRESS@<CRLF>
124     062     063             .ASCII  @T23    READ INVALID CYLINDER ADDRESS@<CRLF>
124     062     064             .ASCII  @T24    FORMAT AT OFFSET@<CRLF>
124     062     065             .ASCII  @T25    IVC FORMAT TEST@<CRLF>
124     062     066             .ASCII  @T26    FORMAT ERROR TEST@<CRLF>
124     062     067             .ASCII  @T27    FORMAT HCE, FIRST HEADER WORD@<CRLF>
124     063     060             .ASCII  @T30    FORMAT HCE, SECOND HEADER WORD@<CRLF>
124     063     061             .ASCII  @T31    FORMAT FE CYLINDERS@<CRLF>
200                             .ASCII  <CRLF>
117     120     105             .ASCII  @OPERATIONAL SWITCH SETTINGS@<CRLF>
055     055     055             .ASCII  @-------------------------@<CRLF>
123     127     111             .ASCII  @SWITCH                 USE@<CRLF>
055     055     055             .ASCII  @------         ------------------@<CRLF>
```

ERROR MESSAGE STRINGS

```
     58 103434      040      040      061  .ASCII  a  15          HALT ON ERROR@<CRLF>
     59 103460      040      040      061  .ASCII  a  14          LOOP ON TEST@<CRLF>
     60 103503      040      040      061  .ASCII  a  13          INHIBIT ERROR TYPEOUTS@<CRLF>
     61 103540      040      040      061  .ASCII  a  12          @<CRLF>
     62 103547      040      040      061  .ASCII  a  11          INHIBIT ITERATIONS@<CRLF>
     63 103600      040      040      061  .ASCII  a  10          BELL ON ERROR@<CRLF>
     64 103624      040      040      040  .ASCII  a   9          LOOP ON ERROR@<CRLF>
     65 103650      040      040      040  .ASCII  a   8          LOOP ON TEST IN SWR<7:0>@<CRLF>
     66 103707      040      040      040  .ASCII  a   7          TN128@<CRLF>
     67 103723      040      040      040  .ASCII  a   6          TN64@<CRLF>
     68 103736      040      040      040  .ASCII  a   5          TN32@<CRLF>
     69 103751      040      040      040  .ASCII  a   4          TN16@<CRLF>
     70 103764      040      040      040  .ASCII  a   3          TN8@<CRLF>
     71 103776      040      040      040  .ASCII  a   2          TN4@<CRLF>
     72 104010      040      040      040  .ASCII  a   1          TN2@<CRLF>
     73 104022      040      040      040  .ASCIZ  a   0          TN1@<CRLF>
     74
     75          000200                   .END    200
```

SYMBOL TABLE

```
ABASE = 176700        ATNMSK= 000377        BUFONE  101716        EBL    = 020000        EH344   101037
ACDW1 = 000000        ATNTBL  065004        BUFTWO  102722        ECH    = 000100        EH353   101175
ACDW2 = 000000        AUNIT = 000000        CC     = 004000        ECI    = 004000        EMS1    072102
ACKSTS  046452        AUSWR = 000000        CH     = 002000        ECRC   = 001000        EMS10   072436
ACPUOP= 000000        AVECT1= 120254        CHGADR  001330        EDT1     071724        EMS100  074656
ADDW0 = 000000        AVECT2= 000000        CHRCNT  061127        EDT110   071742        EMS101  074704
ADDW1 = 000000        A16    = 000400       CKSWR = 104410        EDT111   071744        EMS102  074732
ADDW10= 000000        A17    = 001000       CLKADR  001522        EDT114   071746        EMS103  074761
ADDW11= 000000        BACK   = 000001       CLKVCT  001524        EDT2     071734        EMS104  074770
ADDW12= 000000        BADSCT  032406        CLR    = 000040        EDT223   071750        EMS105  075017
ADDW13= 000000        BADTMO  005344        CLRSTS  045572        EDT336   071760        EMS106  075046
ADDW14= 000000        BAI    = 000010       CMNSTA  007332        EDT337   071770        EMS11   072500
ADDW15= 000000        BB00   = 000001       CMPBUF  035106        EDT344   072000        EMS110  075065
ADDW2 = 000000        BB01   = 000002       CMPERR  043550        EDT353   072012        EMS111  075114
ADDW3 = 000000        BB02   = 000004       CNSL01  064161        ED1      101512        EMS112  075125
ADDW4 = 000000        BB03   = 000010       CNSL02  064171        ED110    101520        EMS113  075211
ADDW5 = 000000        BB04   = 000020       CNSL03  064233        ED111    101524        EMS114  075241
ADDW6 = 000000        BB05   = 000040       CNSL04  064242        ED114    101532        EMS115  075265
ADDW7 = 000000        BB06   = 000100       CNSL07  064276        ED223    101542        EMS116  075270
ADDW8 = 000000        BB07   = 000200       CNSL08  064440        ED336    101552        EMS117  075320
ADDW9 = 000000        BB08   = 000400       CNSL09  064441        ED337    101564        EMS12   072511
ADEVCT= 000000        BB09   = 001000       CNTCLR  045454        ED353    101576        EMS120  075342
ADEVM = 000000        BIT0   = 000001       COMMA   063545        EECC   = 000020        EMS121  075342
ADR    = 000001       BIT00  = 000001       CONT   = 000100        EFT1     072014        EMS122  075405
AENV   = 000000       BIT01  = 000002       CPSAVE  060300        EFT110   072032        EMS123  075442
AENVM = 000000        BIT02  = 000004       CR     = 000015        EFT111   072034        EMS124  075505
AFATAL= 000000        BIT03  = 000010       CRLF   = 000200        EFT114   072036        EMS125  075537
ALL      063534       BIT04  = 000020       CTLFG   001326        EFT2     072024        EMS126  075602
AMADR1= 000000        BIT05  = 000040       CYLMSK= 001777        EFT223   072040        EMS127  075645
AMADR2= 000000        BIT06  = 000100       DBCK   = 100000        EFT336   072050        EMS13   072552
AMADR3= 000000        BIT07  = 000200       DBEN   = 040000        EFT337   072060        EMS130  075704
AMADR4= 000000        BIT08  = 000400       DBL    = 002000        EFT344   072070        EMS131  075742
AMAMS1= 000000        BIT09  = 001000       DCK    = 100000        EFT353   072100        EMS132  076002
AMAMS2= 000000        BIT1   = 000002       DDISP  = 177570        EF110    101670        EMS133  076026
AMAMS3= 000000        BIT10  = 002000       DEBL   = 020000        EF111    101671        EMS134  076051
AMAMS4= 000000        BIT11  = 004000       DEVSEL  043762        EF114    101673        EMS135  076113
AMSGAD= 000000        BIT12  = 010000       DISPLA  001156        EF336    101676        EMS136  076166
AMSGLG= 000000        BIT13  = 020000       DISPRE  000174        EF337    101702        EMS137  076213
AMSGTY= 000000        BIT14  = 040000       DLT    = 100000        EHT1     071600        EMS14   072563
AMTYP1= 000000        BIT15  = 100000       DMD    = 000001        EHT110   071622        EMS140  076250
AMTYP2= 000000        BIT2   = 000004       DPE    = 000010        EHT111   071626        EMS141  076271
AMTYP3= 000000        BIT3   = 000010       DPEHI  = 040000        EHT114   071632        EMS142  076317
AMTYP4= 000000        BIT4   = 000020       DPELO  = 020000        EHT2     071612        EMS143  076334
AOE    = 001000       BIT5   = 000040       DPR    = 000400        EHT223   071636        EMS144  076362
APASS  = 000000       BIT6   = 000100       DRIVES  064636        EHT256   071650        EMS145  076372
APE    - 100000       BIT7   = 000200       DRQ    = 004000        EHT336   071662        EMS146  076421
APRIOR= 000000        BIT8   = 000400       DRVCLR= 000010        EHT337   071674        EMS147  076440
APTCSU= 000040        BIT9   = 001000       DRVSTS  051010        EHT344   071706        EMS15   072574
APTENV= 000001        BLNKS1  064701        DRY    = 000200        EHT353   071720        EMS150  076455
APTSIZ= 000200        BLNKS2  064700        DSWR   = 177570        EH1      100445        EMS151  076474
APTSPO= 000100        BLNKS3  064677        DTASTS  051612        EH110    100464        EMS152  076520
AKGS   = 000004       BLNKS4  064676        DTE    = 010000        EH111    100473        EMS153  076544
ASNDA    001520       BOTADR  061124        DTO    = 010000        EH114    100512        EMS154  076566
ASNDC    001516       BOTFLG  061126        DULPRT= 024026        EH223    100541        EMS155  076602
ASWREG= 000000        BPTVEC= 000014        DVA    = 004000        EH256    100567        EMS156  076622
ATA    = 100000       BSE    = 100000       DVC    = 000200        EH336    100643        EMS157  076640
ATESTN= 000000        BUFFER  101716        EARLY   065330        EH337    100702        EMS16   072616
```

SYMBOL TABLE

EMS160	076655	EMS33	073202	EMT114	066714	EMT177	067502	EMT260	070352
EMS161	076672	EMS34	073230	EMT115	066716	EMT2	065446	EMT261	070364
EMS162	076722	EMS35	073301	EMT116	066726	EMT20	065576	EMT262	070404
EMS163	076722	EMS36	073330	EMT117	066736	EMT200	067604	EMT263	070414
EMS164	076746	EMS37	073357	EMT12	065522	EMT201	067616	EMT264	070424
EMS165	077027	EMS4	072231	EMT120	066746	EMT202	067630	EMT265	070444
EMS166	077043	EMS40	073405	EMT121	066756	EMT203	067642	EMT266	070464
EMS167	077070	EMS41	073434	EMT122	066766	EMT204	067654	EMT267	070476
EMS17	072646	EMS42	073462	EMT123	066776	EMT205	067672	EMT27	065666
EMS170	077115	EMS43	073511	EMT124	067006	EMT206	067702	EMT270	070514
EMS171	077144	EMS44	073540	EMT125	067016	EMT207	067712	EMT271	070530
EMS172	077177	EMS45	073613	EMT126	067026	EMT21	065606	EMT272	070546
EMS173	077217	EMS46	073656	EMT127	067040	EMT210	067724	EMT273	070564
EMS174	077234	EMS47	073705	EMT13	065530	EMT211	067732	EMT274	070602
EMS175	077242	EMS5	072274	EMT130	067052	EMT212	067746	EMT275	070620
EMS176	077270	EMS50	073734	EMT131	067064	EMT213	067762	EMT276	070632
EMS177	077317	EMS51	073763	EMT132	067076	EMT214	067772	EMT277	070646
EMS2	072151	EMS52	074011	EMT133	067110	EMT215	070012	EMT3	065454
EMS20	072706	EMS53	074023	EMT134	067122	EMT216	070024	EMT30	065676
EMS200	077341	EMS54	074035	EMT135	067134	EMT217	070034	EMT300	070664
EMS201	077356	EMS55	074057	EMT136	067146	EMT22	065616	EMT301	070704
EMS202	077424	EMS56	074106	EMT137	067160	EMT220	070044	EMT302	070726
EMS203	077454	EMS57	074163	EMT14	065542	EMT221	070054	EMT303	070740
EMS204	077467	EMS6	072324	EMT140	067170	EMT222	070064	EMT304	070752
EMS205	077515	EMS60	074211	EMT141	067200	EMT223	070074	EMT305	070764
EMS206	077527	EMS61	074224	EMT142	067210	EMT224	070104	EMT306	070776
EMS207	077554	EMS62	074253	EMT143	067220	EMT225	070120	EMT307	071006
EMS21	072731	EMS63	074271	EMT144	067230	EMT226	070140	EMT31	065706
EMS210	077601	EMS64	074317	EMT145	067240	EMT227	070150	EMT310	071026
EMS211	077612	EMS65	074335	EMT146	067250	EMT23	065626	EMT311	071040
EMS212	077630	EMS66	074403	EMT147	067260	EMT230	070164	EMT312	071052
EMS213	077653	EMS67	074453	EMT15	065550	EMT231	070166	EMT313	071064
EMS214	077676	EMS7	072371	EMT150	067270	EMT232	070170	EMT314	071104
EMS215	077714	EMS70	074500	EMT151	067300	EMT233	070172	EMT315	071116
EMS216	077735	EMS71	074512	EMT152	067312	EMT234	070174	EMT316	071130
EMS217	077765	EMS72	074525	EMT153	067324	EMT235	070176	EMT317	071142
EMS22	072754	EMS73	074535	EMT154	067342	EMT236	070200	EMT32	065716
EMS220	100020	EMS74	074552	EMT155	067360	EMT237	070202	EMT320	071152
EMS221	100040	EMS75	074571	EMT156	067372	EMT24	065636	EMT321	071162
EMS222	100110	EMS76	074577	EMT157	067404	EMT240	070204	EMT322	071172
EMS223	100141	EMS77	074630	EMT16	065556	EMT241	070206	EMT323	071200
EMS224	100216	EMTVEC=	000030	EMT160	067416	EMT242	070210	EMT324	071210
EMS225	100270	EMT1	065442	EMT161	067426	EMT243	070212	EMT325	071222
EMS226	100313	EMT10	065512	EMT162	067440	EMT244	070214	EMT326	071234
EMS227	100342	EMT100	066516	EMT163	067452	EMT245	070216	EMT327	071252
EMS23	072770	EMT101	066534	EMT164	067462	EMT246	070220	EMT33	065726
EMS230	100353	EMT102	066552	EMT165	067470	EMT247	070230	EMT330	071264
EMS231	100402	EMT103	066562	EMT166	067476	EMT25	065646	EMT331	071274
EMS232	100420	EMT104	066574	EMT167	067504	EMT250	070242	EMT332	071306
EMS24	073016	EMT105	066612	EMT17	065566	EMT251	070256	EMT333	071320
EMS25	073045	EMT106	066622	EMT170	067512	EMT252	070264	EMT334	071336
EMS26	073062	EMT107	066632	EMT171	067524	EMT253	070272	EMT335	071354
EMS27	073103	EMT11	065516	EMT172	067534	EMT254	070310	EMT336	071374
EMS3	072166	EMT110	066652	EMT173	067544	EMT255	070320	EMT337	071404
EMS30	073114	EMT111	066664	EMT174	067554	EMT256	070330	EMT34	065736
EMS31	073124	EMT112	066672	EMT175	067566	EMT257	070340	EMT340	071414
EMS32	073153	EMT113	066700	EMT176	067574	EMT26	065656	EMT341	071426

SYMBOL TABLE

```
EMT342  071434        ERTY00  061130        ILRG60= 000060        OFD    = 000200        RMAS   = 000016
EMT343  071446        ERTY01  061135        ILRG62= 000062        OFFSET= 000014         RMASI    001354
EMT344  071460        ERTY02  061145        ILRG64= 000064        OM     = 000001        RMASO    001430
EMT345  071472        ERTY03  061154        ILRG66= 000066        ONES     065054        RMBA   = 000004
EMT346  071502        ERTY04  061162        ILRG70= 000070        OPE    = 020000        RMBAE  = 000050
EMT347  071516        ERTY05  061165        ILRG72= 000072        OPI    = 020000        RMBAEI   001406
EMT35   065746        ESRC   = 004000        ILRG74= 000074        OR     = 000200        RMBAEO   001462
EMT350  071530        FER    = 000020        ILRG76= 000076        PACACK= 000022         RMBAI    001342
EMT351  071546        FIND   = 000001        IOTVEC= 000020        PAKACK= 000022         RMBAO    001416
EMT352  071556        FMT16  = 010000        IPCK0  = 000001       PAR    = 000010        RMCS1  = 000000
EMT353  071562        FNCDTB  064704         IPCK1  = 000002       PAT    = 000020        RMCS1I   001336
EMT354  071572        FNCMSK= 000077         IPCK2  = 000004       PDA    = 000400        RMCS1O   001412
EMT36   065756        F0     = 000002        IPCK3  = 000010       PFECH    061172        RMCS2  = 000010
EMT37   065766        F1     = 000004        IR     = 000100       PFECH1   061202        RMCS2I   001346
EMT4    065462        F2     = 000010        IVC    = 010000       PFECH2   061270        RMCS2O   001422
EMT40   065776        F3     = 000020        LBC    = 002000       PFECH3   061306        RMCS3  = 000052
EMT41   066004        F4     = 000040        LBT    = 002000       PFECH4   061314        RMCS3I   001410
EMT42   066014        GENBUF  034640         LF     = 000012       PGE    = 002000        RMCS3O   001464
EMT43   066026        GFT     035534         LODEV    064544       PGM    = 001000        RMDA   = 000006
EMT44   066036        GETBUF  001336         LS     = 000004       PHA    = 000200        RMDAI    001344
EMT45   066046        GETINX  001526         LSC    = 004000       PIP    = 020000        RMDAO    001420
EMT46   066056        GETSSF  034514         LST    = 000002       PIRQ   = 177772        RMDB   = 000022
EMT47   066066        GETSTS  035450         LSTRK    001334       PIRQVE= 000240         RMDBI    001360
EMT5    065470        GO     = 000001        MCLK   = 004000       PLFS   = 002000        RMDBO    001434
EMT50   066074        GTSWR  = 104407        MCPE   = 020000       PRIERR   036552        RMDC   = 000034
EMT51   066104        HCE    = 000200        MDF    = 000100       PR0    = 000000        RMDCI    001372
EMT52   066116        HCI    = 002000        MDPE   = 000400       PR1    = 000040        RMDCO    001446
EMT53   066134        HCRC   = 000400        MEDENB   001512       PR2    = 000100        RMDS   = 000012
EMT54   066152        HELP     101716        MFGFIL   103726       PR3    = 000140        RMDSI    001350
EMT55   066162        HT     = 000011        MI     = 000004       PR4    = 000200        RMDSO    001422
EMT56   066174        IAE    = 002000        MIXED    065014       PR5    = 000240        RMDT   = 000026
EMT57   066212        IBSAVE  060302         MOC    = 000400       PR6    = 000300        RMDTI    001364
EMT6    065476        IDXMSK= 000077         MOH    = 020000       PR7    = 000340        RMDTO    001440
EMT60   066222        IE     = 000100        MOL    = 010000       PS     = 177776        RMEC1  = 000044
EMT61   066240        ILF    = 000001        MRD    = 002000       PSEL   = 002000        RMEC1I   001402
EMT62   066260        ILF02  = 000002        MS     = 000040       PSW    = 177776        RMEC1O   001456
EMT63   066274        ILF24  = 000024        MSC    = 000002       PUT      036004        RMEC2  = 000046
EMT64   066304        ILF26  = 000026        MSDRVS   064462       PUTBUF   001412        RMEC2I   001404
EMT65   066324        ILF30  = 000030        MSE    = 100000       PUTINX   001555        RMEC2O   001460
EMT66   066344        ILF32  = 000032        MSER   = 000200       PWRVEC= 000024         RMER1  = 000014
EMT67   066356        ILF34  = 000034        MSGDRV   064476       QUES     063541        RMER1I   001352
EMT7    065504        ILF36  = 000036        MSHELP   063550       RCLSTS   047246        RMER1O   001426
EMT70   066370        ILF40  = 000040        MUR    = 001000       RD     = 000070        RMER2  = 000042
EMT71   066400        ILF42  = 000042        MWD    = 000010       RDCHR  = 104411        RMER2I   001400
EMT72   066410        ILF44  = 000044        MWP    = 000010       RDLIN  = 104412        RMER2O   001454
EMT73   066426        ILF46  = 000046        MXF    = 001000       RDOCT  = 104413        RMHR   = 000036
EMT74   066444        ILF54  = 000054        N        064672       RDY    = 000200        RMHRI    001374
EMT75   066454        ILF56  = 000056        NDTMSK= 115760        READY    007524        RMHRO    001450
EMT76   066474        ILF64  = 000064        NED    = 010000       RECAL  = 000006        RMLA   = 000020
EMT77   066504        ILF66  = 000066        NEM    = 004000       RESREG= 104415         RMLAI    001356
ENRGDT  065442        ILF74  = 000074        NONE     064665       RESVEC= 000010         RMLAO    001432
EQUALS  063532        ILF76  = 000076        NOP    = 000000       REX    = 010000        RMMR1  = 000024
ERR    = 040000       ILR    = 000002        NOTAVL   064576       RG     = 040000        RMMR1I   001362
ERRNMB  061122        ILRG50= 000050         NOTPRS   064561       RGDTPT   065014        RMMR1O   001436
ERROR  = 104000       ILRG52= 000052         NOTRM    064527       RH     = 000072        RMMR2  = 000040
ERRTYP  060304        ILRG54= 000054         NSA    = 100000       RIP    = 000020        RMMR2I   001376
ERRVEC= 000004        ILRG56= 000056         OCC    = 100000       RLEASE= 000012         RMMR2O   001452
```

SYMBOL TABLE

```
RMOF   = 000032        STSD4   101656        TST12   016560        $ATY3   063206        $GTSWR  061720
RMOFI    001370        STSF    101707        TST13   017220        $ATY4   063216        $GT42P  031366
RMOFO    001444        STSH1   101251        TST14   017674        $AUTOB  001150        $HD    = 000000
RMR    = 000004        STSH2   101326        TST15   020516        $BASE   001276        $HIBTS  001100
RMSN   = 000030        STSH3   101415        TST16   021260        $BDADR  001136        $HIOCT  062712
RMSNI    001366        STSH4   101453        TST17   022022        $BDDAT  001142        $ICNT   001120
RMSNO    001442        SWR     001154        TST2    010076        $BELL   001212        $ILLUP  063162
RMWC   = 000002        SWREG   000176        TST20   022374        $BIN    056104        $INTAG  001151
RMWCI    001340        SW0    = 000001        TST21   022746        $CDW1   001302        $ITEMB  001130
RMWCO    001414        SW00   = 000001        TST22   023310        $CDW2   001304        $LF     001220
RQA    = 100000        SW01   = 000002        TST23   023632        $CHARC  057110        $LFLG   063443
RQB    = 040000        SW02   = 000004        TST24   024150        $CKSWR  061630        $LPADR  001122
RTC    = 000016        SW03   = 000010        TST25   025062        $CMTAG  001114        $LPERR  001124
R6     =%000006        SW04   = 000020        TST26   025704        $CM3   = 000000        $MADR1  001254
R7     =%000007        SW05   = 000040        TST27   026606        $CM4   = 000005        $MADR2  001260
SADMSK= 000377         SW06   = 000100        TST3    011010        $CNTLC  062526        $MADR3  001264
SAVREG= 104414         SW07   = 000200        TST30   027674        $CNTLG  062540        $MADR4  001270
SA1    = 000001        SW08   = 000400        TST31   030520        $CNTLU  062533        $MAIL   001222
SA16   = 000020        SW09   = 001000        TST4    011644        $CPUOP  001250        $MAMS1  001252
SA2    = 000002        SW1    = 000002        TST5    012434        $CRLF   001217        $MAMS2  001256
SA4    = 000004        SW10   = 002000        TST6    013374        $DBLK   056322        $MAMS3  001262
SA8    = 000010        SW11   = 004000        TST7    014214        $DDW0   001306        $MAMS4  001266
SC     = 100000        SW12   = 010000        TYPBN  = 104406        $DDW1   001310        $MBADR  001102
SCOPE  = 000004        SW13   = 020000        TYPDS  = 104405        $DDW2   001312        $MFLG   063442
SCTMSG   063446        SW14   = 040000        TYPE   = 104401        $DDW3   001314        $MNEW   062556
SCTMSK= 003700         SW15   = 100000        TYPOC  = 104402        $DDW4   001316        $MSGAD  001236
SC0    = 000100        SW2    = 000004        TYPON  = 104404        $DDW5   001320        $MSGLG  001240
SC1    = 000200        SW3    = 000010        TYPOS  = 104403        $DDW6   001322        $MSGTY  001222
SC2    = 000400        SW4    = 000020        UNS    = 040000        $DDW7   001324        $MSWR   062545
SC3    = 001000        SW5    = 000040        UNTMSK= 000007         $DEVCT  001232        $MTYP1  001253
SC4    = 002000        SW6    = 000100        UNTOFF   064615        $DEVM   001300        $MTYP2  001257
SEARCH= 000030         SW7    = 000200        UNTON    064626        $DOAGN  031412        $MTYP3  001263
SECERR   037404        SW8    = 000400        UPE    = 020000        $DTBL   056312        $MTYP4  001267
SEEK   = 000004        SW9    = 001000        USE    = 040000        $ENDAD  031402        $MXCNT  057576
SEKSTS   044174        SYSTAT   064504        USRFIL   104734        $ENDCT  031240        $NULL   001170
SHUT     031422        TADMSK= 177400         U0     = 000001        $ENULL  031416        $NWTST= 000001
SHUT2    062570        TAG    = 020000        U1     = 000002        $ENV    001242        $OCNT   056554
SIZCLK   036234        TAGADR= 001114         U2     = 000004        $ENVM   001243        $OMODE  056556
SKI    = 040000        TAP    = 040000        VV     = 000100        $EOP    031204        $OVER   057562
SNGPRT= 020026         TA1    = 000400        WC     = 000040        $EOPCT  031232        $PASS   001230
SSE    = 000040        TA2    = 001000        WCD    = 000050        $EOSP   031146        $PASTM  001106
SSEI   = 001000        TA4    = 002000        WCE    = 040000        $ERFLG  001117        $POWER  063170
SSF    = 020000        TA8    = 004000        WCEHI  = 010000        $ERMAX  001131        $PWRDN  063022
SSFENB   001514        TBITVE= 000014         WCELO  = 004000        $ERROR  057710        $PWRMG  063156
SSFIL    105742        TIMOUT   036356        WCF    = 000040        $ERRPC  001132        $PWRUP  063074
STACK  = 001100        TKVEC  = 000060        WCH    = 000052        $ERRTB  001604        $QUES   001216
STANDA   006654        TPVEC  = 000064        WD     = 000060        $ERTTL  001126        $RDCHR  062172
START    005434        TRAPVE= 000034         WH     = 000062        $ESCAP  001210        $RDLIN  062262
START1   005424        TRE    = 040000        WLE    = 004000        $ETABL  001242        $RDOCT  062612
START2   005440        TRTVEC= 000014         WRL    = 004000        $ETEND  001326        $RDSZ  = 000010
STCDRV   055232        TST    = 010000        XSIZ     006364        $FATAL  001224        $RESRE  055774
STIMER   036520        TSTNMB   061120        XXDP     001332        $FFLG   063444        $RM80   064522
STKLMT= 177774         TSTPRP   031456        Y        064674        $FILLC  001172        $RTNAD  031414
STOP     057662        TSTQUE   001466        ZEROS    065116        $FILLS  001171        $SAVRE  055736
STSD1    101606        TST1     007676        $APTHD   001100        $GDADR  001134        $SAVR6  063166
STSD2    101624        TST10    015004        $ATYC    063224        $GDDAT  001140        $SCOPE  057114
STSD3    101644        TST11    015742        $ATY1    063200        $GET42  031372        $SETUP= 000137
```

SYMBOL TABLE

```
$STUP = 177777          $TKINT  061330          $TMP4   001204          $TTYIN  062516          $USWR   001246
$SVLAD  057526          $TKQEN= 061327          $TN    = 000032          $TYPBN  056032          $VECT1  001272
$SVPC = 000210          $TKQIN  061322          $TPB    001166          $TYPDS  056106          $VECT2  001274
$SWR  = 167400          $TKQOU  061324          $TPFLG  001173          $TYPE   056560          $XOFF = 000023
$SWREG  001244          $TKQSR  061326          $TPS    001164          $TYPFC  056772          $XON  = 000021
$SWRMK= 000000          $TKS    001160          $TRAP   062714          $TYPEX  057112          $XTSTR  057136
$SW08T  057600          $TKSRV  061400          $TRAP2  062754          $TYPOC  056356          $$GET4= 000000
$TESTN  001226          $TMP0   001174          $TRP   = 000016          $TYPON  056372          $$SW08= 000032
$TIMES  001206          $TMP1   001176          $TRPAD  062766          $TYPOS  056332          $OFILL  056555
$TKB    001162          $TMP2   001200          $TSTM   001104          $UNIT   001234          .$X    = 001100
$TKCNT  061320          $TMP3   001202          $TSTNM  001116          $UNITM  001110

. ABS.  106040      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  61952 WORDS  ( 242 PAGES)
DYNAMIC MEMORY AVAILABLE FOR  70 PAGES
CZRNEA.BIC,CZRNEA/C=CZRNEA.DOC,CZRNEA,[20,0]SYSMAC/M
```

CZRNEA0 RM80 FCTNL PT2 MACRO V04.00 28-JAN-82 16:38:23 PAGE S-1 SEQ 0275
CROSS REFERENCE TABLE (CREF V04.00)

```
$$GET4  14-20    14-20#
$$SW08  41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1
        41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1
        41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1
        41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1     41-1#    41-1#    41-1#    41-1#    41-1#    41-1#
        41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#    41-1#
        41-1#    41-1#    41-1#    41-1#    41-1#    41-1#
$OFILL  39-1     39-1#    39-1*    39-1*
$40CAT  41-1     42-1
$APTHD   5-8      5-8#
$ASTAT  48-1     48-1
$ATY1   48-1#
$ATY3   40-1     48-1#
$ATY4   42-1     48-1#
$ATYC   48-1     48-1#
$AUTOB   6-0#    10-28*   44-1     44-1     44-1
$BASE    6-0#    10-75    11-33    11-42*   12-54    13-2     13-33    13-146   13-244   13-337   13-462   13-558   13-651   13-775
        13-872   13-948   13-:26   13-:26   13-<09   13-<92   13-=48   13->02   13->57   13-?07   13-?56   13-@62   13-A60   13-B73
        13-D27   13-E36   20-36    21-30    23-12    27-23    29-15    43-25    59-2
$BDADR   6-0#    13-442*  13-443*  13-453   13-754*  13-755*  13-765   18-84*   59-8
$BDDAT   6-0#    13-435*  13-450*  13-457   13-748*  13-762*  13-770   13-A19*  13-A50*  13-B60*  13-C63*  13-C76*  13-C89*  13-D02*
        13-E11*  18-82*   24-47*   24-48*   24-51    24-69*   24-75*   24-91*   24-108*  24-124*  24-152*  25-36*   25-37*   25-49*
        25-50*   25-60*   25-61*   25-63    25-81*   25-82*   25-83    25-103*  25-104*  25-105   25-136*  25-137*  25-138   25-152*
        25-153*  25-154   25-166*  25-167*  25-179*  25-180*  25-196*  25-197*  25-222*  25-223*  25-237*  25-238*  25-252*  25-253*
        25-267*  25-268*  25-280*  25-281*  25-310*  25-311*  25-325*  25-326*  25-340*  25-341*  25-357*  25-358*  25-383*  25-384*
        25-398*  25-399*  25-413*  25-414*  25-428*  25-429*  25-459*  25-460*  25-482*  25-483*  25-497*  25-498*  25-519*  25-520*
        25-538*  25-562*  25-623*  25-624*  25-630   25-638   25-654*  25-655*  25-656   25-682*  25-683*  25-684   25-699*  25-700
        25-712*  25-713   26-39*   26-53*   28-37*   28-71*   28-72*   28-73    28-93*   28-104*  28-105*  28-111   28-122   28-135*
        28-148*  28-173*  28-187*  28-188*  28-201*  28-217*  30-29*   30-30*   30-32    30-42*   30-51*   30-59    30-69*   30-70*
        30-79*   30-80*   30-82    30-92*   30-101*  30-102*  30-104   30-114*  30-115*  30-124*  30-125*  30-127   31-27*   31-41*
        31-57*   31-71*   31-85*   31-99*   31-113*  32-35*   32-49*   32-65*   32-82*   32-103*  32-120*  32-134*  32-159*  32-174*
        32-189*  32-205*  32-222*  32-240*  32-254*  32-270*  33-16*   33-17*   33-19    33-28*   33-29*   33-31    33-41*   33-50*
        33-57*   33-60    33-69*   33-70*   33-72    33-81*   33-82*   33-84    33-94*   33-103*  34-31*   34-47*   34-67*   34-87*
        34-116*  34-135*  34-149*  34-163*  34-193*  34-194*  34-195   34-207*  34-208*  34-244*  34-260*  34-274*  34-292*  34-305*
        34-317*  34-360*  34-373*  34-386*  34-399*  34-421*  34-446*  34-461*  34-474*  34-487*  34-500*  34-521*  34-538*  34-554*
        35-46*   35-62*   35-78*   35-98*   35-112*  59-1     59-6     59-8     59-10    59-11
$BELL    6-0#    42-1     42-1     42-1     44-1     44-1     44-1
$BIN    37-1     37-1#    37-1*    37-1*
$CDW1    6-0#
$CDW2    6-0#
$CHARC  40-1     40-1#    40-1*    40-1*    40-1*
$CKSWR  44-1#    46-1     46-1
$CM3     6-0      6-0#
$CM4     6-0      6-0      6-0      6-0      6-0      6-0      6-0      6-0      6-0      6-0      6-0#     6-0#     6-0#     6-0#
         6-0#     6-0#
$CMTAG   6-0#    10-23    10-23    10-23    10-23    10-23    10-23    10-23
$CNTLC  44-1     44-1     44-1     44-1     44-1#
$CNTLG  44-1     44-1#
$CNTLU  44-1     44-1     44-1#
$CPUOP   6-0#
$CRLF    6-0#    10-48    10-80    10-129   11-20    11-28    11-62    11-100   12-25    12-60    14-20    40-1     40-1     40-1
        42-1     42-1     42-1     43-20    43-53    43-96    43-106   43-118   43-126   43-146   44-1     44-1     44-1     44-1
$DBLK   38-1     38-1     38-1#
$DDW0    6-0#
$DDW1    6-0#
$DDW2    6-0#
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CROSS REFERENCE TABLE (CREF V04.00)

$DDW3 6-0#
$DDW4 6-0#
$DDW5 6-0#
$DDW6 6-0#
$DDW7 6-0#
$DEVCT 6-0#
$DEVM 6-0# 10-67* 10-78 10-106* 10-110* 11-63* 11-70* 11-97* 11-98 12-4 12-38 13-29* 14-28*
$DOAGN 14-20 14-20 14-20#
$DTBL 38-1 38-1#
$ENDAD 5-5 10-28 14-20# 42-1
$ENDCT 10-23 14-20#
$ENULL 14-20#
$ENV 6-0# 10-28 40-1 42-1 48-1 48-1
$ENVM 6-0# 10-23 10-71 40-1 40-1 48-1
$EOP 14-20# 14-29
$EOPCT 10-23* 14-20 14-20#
$EOSP 14-9#
$ERFLG 6-0# 41-1 41-1 41-1 41-1 41-1 41-1* 42-1 42-1 42-1*
$ERMAX 6-0# 10-23* 41-1 41-1 41-1 41-1*
$ERROR 10-23 42-1#
$ERRPC 6-0# 42-1 42-1 42-1 42-1* 42-1* 43-46
$ERRTB 8-0# 43-64
$ERTTL 6-0# 14-20 14-20 14-20* 42-1 42-1 42-1*
$ESCAP 6-0# 10-23* 41-1* 42-1 42-1 42-1 42-1
$ETABL 6-0#
$ETEND 5-8 6-0#
$FATAL 6-0# 48-1*
$FFLG 48-1 48-1# 48-1* 48-1* 48-1*
$FILLC 6-0# 40-1 40-1 40-1
$FILLS 6-0# 40-1 40-1
$GDADR 6-0# 13-41* 13-453 13-753* 13-765 18-83* 59-8
$GDDAT 6-0# 13-433* 13-434* 13-451* 13-452* 13-457 13-746* 13-747* 13-763* 13-764* 13-770 13-A20* 13-A21* 13-A51*
13-A52* 13-B61* 13-B62* 13-C64* 13-C65* 13-C77* 13-C78* 13-C90* 13-C91* 13-D03* 13-D04* 13-E12* 13-E13* 18-81*
24-49* 24-50* 24-51 24-67* 24-68* 24-74* 24-76* 24-88* 24-89* 24-90* 24-106* 24-107* 24-122* 24-123*
24-150* 24-151* 25-38* 25-51* 25-62* 25-63 25-75* 25-80* 25-83 25-94* 25-102* 25-105 25-131* 25-134*
25-135* 25-138 25-150* 25-151* 25-154 25-161* 25-544* 25-551* 25-552* 25-553* 25-554* 25-558* 25-560 25-622*
25-637* 25-638 25-648* 25-653* 25-656 25-666* 25-679* 25-684 25-696* 25-697* 25-698* 25-700 25-710* 25-711*
25-713 26-40* 26-54* 28-36* 28-48* 28-68* 28-73 28-92* 28-106* 28-107* 28-134* 28-147* 28-171* 28-172*
28-186* 28-199* 28-200* 28-215* 28-216* 30-31* 30-32 30-41* 30-57* 30-59 30-68* 30-81* 30-82 30-91*
30-103* 30-104 30-113* 30-126* 30-127 31-25* 31-26* 31-39* 31-40* 31-58* 31-59* 31-72* 31-73* 31-86*
31-87* 31-100* 31-101* 31-114* 31-115* 32-33* 32-34* 32-47* 32-48* 32-63* 32-64* 32-80* 32-81* 32-101*
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32-221* 32-238* 32-239* 32-252* 32-253* 32-268* 32-269* 33-18* 33-19 33-30* 33-31 33-40* 33-71* 33-72
33-83* 33-84 33-92* 34-29* 34-30* 34-45* 34-46* 34-65* 34-66* 34-85* 34-86* 34-114* 34-115* 34-133*
34-134* 34-147* 34-148* 34-161* 34-162* 34-172* 34-191* 34-195 34-209* 34-210* 34-242* 34-243* 34-258* 34-259*
34-272* 34-273* 34-290* 34-291* 34-303* 34-304* 34-318* 34-319* 34-327* 34-358* 34-359* 34-371* 34-372* 34-384*
34-385* 34-397* 34-398* 34-419* 34-420* 34-444* 34-445* 34-459* 34-460* 34-472* 34-473* 34-485* 34-486* 34-498*
34-499* 34-519* 34-520* 34-536* 34-537* 34-552* 34-553* 35-44* 35-45* 35-60* 35-76* 35-77* 35-96* 35-97*
35-110* 35-111* 59-1 59-6 59-8 59-10 59-11
$GET42 12-34 12-43 13-30 14-20#
$GT42P 14-20 14-20#
$GTSWR 44-1# 46-1 46-1
$HD 4-488 4-488 4-488
$HIBTS 5-8#
$HIOCT 45-1# 45-1*
$ICNT 6-0# 41-1 41-1 41-1 41-1* 41-1*

CROSS REFERENCE TABLE (CREF V04.00)

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$ILLUP  47-1     47-1     47-1#
$INTAG   6-0#    44-1     44-1     44-1     44-1     44-1*
$ITEMB   6-0#    42-1     42-1     42-1     42-1     42-1     42-1*    42-1*    43-41
$LF      6-0#    40-1     40-1     42-1     42-1     44-1     44-1     44-1
$LFLG   48-1#    48-1*
$LPADR   6-0#    10-23*   41-1     41-1     41-1     41-1*    41-1*    41-1*
$LPERR   6-0#    10-23*   41-1     41-1     41-1     41-1*    42-1
$MADR1   6-0#
$MADR2   6-0#
$MADR3   6-0#
$MADR4   6-0#
$MAIL    5-8      5-8      6-0#     10-23    10-28    13-2     13-33    13-146   13-244   13-337   13-462   13-558   13-651   13-775
        13-872   13-948   13-:26   13-;26   13-<09   13-<92   13-=48   13->02   13->57   13-?07   13-?56   13-@62   13-A60   13-B73
        13-D27   13-E36   40-1     41-1     42-1
$MAMS1   6-0#
$MAMS2   6-0#
$MAMS3   6-0#
$MAMS4   6-0#
$MBADR   5-8#
$MFLG   48-1     48-1#    48-1*    48-1*
$MNEW   44-1     44-1#
$MSGAD   6-0#    48-1     48-1*
$MSGLG   6-0#    48-1*
$MSGTY   6-0#    48-1     48-1     48-1*    48-1*
$MSWR   44-1     44-1#
$MTYP1   6-0#
$MTYP2   6-0#
$MTYP3   6-0#
$MTYP4   6-0*
$MXCNT  41-1     41-1     41-1     41-1#
$NULL    6-0#    40-1     40-1     40-1
$NWTST  13-2     13-2#    13-2#    13-33    13-33#   13-33#   13-146   13-146#  13-146#  13-244   13-244#  13-244#  13-337   13-337#
        13-337#  13-462   13-462#  13-462#  13-558   13-558#  13-558#  13-651   13-651#  13-651#  13-775   13-775#  13-775#  13-872
        13-872#  13-872#  13-948   13-948#  13-948#  13-:26   13-:26#  13-:26#  13-;26   13-;26#  13-;26#  13-<09   13-<09#  13-<09#
        13-<92   13-<92#  13-<92#  13-=48   13-=48#  13-=48#  13->02   13->02#  13->02#  13->57   13->57#  13->57#  13-?07   13-?07#
        13-?07#  13-?56   13-?56#  13-?56#  13-@62   13-@62#  13-@62#  13-A60   13-A60#  13-A60#  13-B73   13-B73#  13-B73#  13-D27
        13-D27#  13-D27#  13-E36   13-E36#  13-E36#
$OCNT   39-1#    39-1*    39-1*
$OMODE  39-1     39-1#    39-1*    39-1*    39-1*    39-1*
$OVER   41-1     41-1     41-1     41-1     41-1#
$PASS    6-0#    10-23*   14-20    14-20    14-20    14-20*   14-20*   41-1     41-1     41-1
$PASTM   5-8#
$POWER  47-1     47-1#
$PWRDN  10-23    47-1     47-1#
$PWRMG  47-1&
$PWRUP  47-1     47-1#
$QUES    6-0#    40-1     40-1     42-1     42-1     44-1     44-1     44-1     44-1
$R2A    46-1
$RDCHR  44-1#    46-1     46-1
$RDDEC  46-1
$RDLIN  44-1#    46-1     46-1
$RDOCT  45-1#    46-1     46-1
$RDSZ   44-1     44-1#
$RESRE  36-1#    46-1
$RM80   10-91    43-28    49-26#
$RTNAD  14-20#
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CROSS REFERENCE TABLE (CREF V04.00)

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$SAVR6  47-1     47-1#    47-1*    47-1*    47-1*
$SAVRE  36-1#    46-1     46-1
$SCOPE  10-23    41-1#
$SETUP   4-785    4-785     4-785     4-785     4-785     4-785     4-785#    4-785#    4-785#    4-785#    4-785#    4-785#    4-785#    10-23
        10-23    10-23     10-23     10-23     10-23     10-23     10-23     10-23     10-23     10-23     10-23     10-28     10-28     10-28
        14-20    14-20     41-1      42-1      42-1      42-1      42-1      44-1      44-1      44-1      44-1      44-1
$STUP    4-785    4-785     4-785     4-785     4-785     4-785     4-785#    4-785#    4-785#    4-785#    4-785#    4-785#    4-785#    4-785#
        4-785#   4-785#    4-785#    4-785#
$SVLAD  41-1     41-1#
$SVPC    5-5      5-5#
$SW08T  41-1     41-1#
$SWR     4-477#   4-488     4-489     4-489     4-489     4-489     4-489     4-489     4-489     4-489     6-0       6-0       6-0       10-23
        10-23    10-23     10-23     10-23     13-2      13-33     13-146    13-244    13-337    13-462    13-558    13-651    13-775    13-872
        13-948   13-:26    13-;26    13-<09    13-<92    13-=48    13->02    13->57    13-?07    13-?56    13-@62    13-A60    13-B73    13-D27
        13-E36   14-20     14-20     14-20     14-20     14-20     41-1      41-1      41-1      41-1      41-1      41-1      41-1      41-1
        41-1     41-1      41-1      41-1      41-1      41-1      41-1      41-1      41-1      41-1      41-1      41-1      42-1      42-1
        42-1     42-1      42-1      42-1      42-1      42-1      42-1      42-1      42-1      47-1
$SWREG   6-0#    10-23
$SWRMK   4-489    4-489     4-489     4-489     4-489     4-489     4-489     4-489     4-489     41-1      41-1      41-1      41-1      41-1
        41-1     41-1      41-1      41-1      41-1
$TESTN   6-0#    13-2*     13-33*    13-146*   13-244*   13-337*   13-462*   13-558*   13-651*   13-775*   13-872*   13-948*   13-:26*   13-;26*
        13-<09*  13-<92*    13-=48*   13->02*   13->57*   13-?07*   13-?56*   13-@62*   13-A60*   13-B73*   13-D27*   13-E36*   41-1*     43-37
$TIMES   6-0#    10-23*    12-46*    13-E36*   14-20*    41-1      41-1      41-1      41-1*     41-1*
$TKB     6-0#    40-1      40-1      44-1      44-1      44-1      44-1      44-1      44-1      44-1
$TKCNT  44-1     44-1      44-1#     44-1*     44-1*     44-1*
$TKINT  11-4     12-49     44-1      44-1      44-1#
$TKQEN  44-1     44-1      44-1#
$TKQIN  44-1     44-1      44-1#     44-1*     44-1*     44-1*     44-1*
$TKQOU  44-1     44-1      44-1#     44-1*     44-1*     44-1*
$TKQSR  44-1     44-1      44-1      44-1#
$TKS     6-0#    40-1      40-1      44-1      44-1      44-1      44-1      44-1      44-1*     44-1*     44-1*     44-1*     44-1*     44-1*
$TKSRV  44-1     44-1#
$TMP0    6-0#    13-46*    13-158*   13-256*   13-349*   13-474*   13-570*   13-663*   13-788*   13-:38*   13-;39*   13-<22*   13-?68*   13-@74*
        13-A73*  13-B88*    13-D05*   13-D42*   13-E14*   17-59     18-85*    20-41*    21-35*    27-29*    27-31     59-3      59-6      59-10
$TMP1    6-0#    11-13*    11-14     11-16     11-36*    11-38     11-42     11-50*    11-52     11-56     11-66*    11-67     11-73     11-75
        11-76    11-78     11-83*    11-84     11-87     11-88     11-90     11-95     13-47*    13-159*   13-257*   13-350*   13-475*   13-571*
        13-664*  13-789*   13-:39*   13-;40*   13-<23*   13-?69*   13-@75*   13-A74*   13-B89*   13-D06*   13-D43*   13-E15*   17-60     20-42*
        20-43    21-36*    21-37     26-24*    26-25*    26-37     26-39     27-28*    27-37     59-3      59-5      59-10
$TMP2    6-0#    26-27*    26-28*    26-50     26-53     59-5
$TMP3    6-0#
$TMP4    6-0#
$TN      4-478#   4-488     13-2      13-2      13-2      13-2#     13-33     13-33     13-33     13-33#    13-146    13-146    13-146    13-146#
        13-244   13-244    13-244    13-244#   13-337    13-337    13-337    13-337#   13-462    13-462    13-462    13-462#   13-558    13-558
        13-558   13-558#   13-651    13-651    13-651    13-651#   13-775    13-775    13-775    13-775#   13-872    13-872    13-872    13-872#
        13-948   13-948    13-948    13-948#   13-:26    13-:26    13-:26    13-:26#   13-;26    13-;26    13-;26    13-;26#   13-<09    13-<09
        13-<09   13-<09#   13-<92    13-<92    13-<92    13-<92#   13-=48    13-=48    13-=48    13-=48#   13->02    13->02    13->02    13->02#
        13->57   13->57    13->57    13->57#   13-?07    13-?07    13-?07    13-?07#   13-?56    13-?56    13-?56    13-?56#   13-@62    13-@62
        13-@62   13-@62#   13-A60    13-A60    13-A60    13-A60#   13-B73    13-B73    13-B73    13-B73#   13-D27    13-D27    13-D27    13-D27#
        13-E36   13-E36    13-E36    13-E36#   41-1      41-1
$TPB     6-0#    40-1      40-1      40-1*
$TPFLG   6-0#    40-1      40-1      40-1
$TPS     6-0#    40-1      40-1      40-1
$TRAP   10-23    46-1#
$TRAP2  46-1     46-1#
$TRP    46-1     46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1
        46-1     46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1      46-1
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CROSS REFERENCE TABLE (CREF V04.00)

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        46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1
        46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1     46-1#    46-1#    46-1#    46-1#
        46-1#    46-1#    46-1#    46-1#    46-1#    46-1#    46-1#    46-1#    46-1#    46-1#
$TRPAD  46-1     46-1#
$TSTM    5-8#
$TSTNM   6-0#    12-45*   14-20*   41-1     41-1     41-1     41-1     41-1     41-1*    41-1*    42-1     42-1     42-1     44-4
$TTYIN  44-1     44-1     44-1     44-1     44-1     44-1#
$TYPBN  37-1#    46-1     46-1
$TYPDS  38-1#    46-1     46-1
$TYPE   40-1#    46-1     46-1     48-1
$TYPEC  40-1     40-1     40-1     40-1#    44-1
$TYPEX  40-1     40-1     40-1#
$TYPOC  39-1#    46-1     46-1
$TYPON  39-1     39-1#    46-1
$TYPOS  39-1#    46-1
$UNIT    6-0#    12-51*   12-56    12-62    24-49    43-22
$UNITM   5-8#
$USWR    6-0#
$VECT1   6-0#    11-46    11-56*
$VECT2   6-0#
$XOFF   40-1     40-1
$XON    40-1     40-1     44-1
$XTSTR  41-1#
.$ASTA  48-1     48-1
.$X      5-8      5-8#
A16      4-731#
A17      4-730#
ABASE    4-782#   6-0      6-0
ACDW1    6-0      6-0
ACDW2    6-0      6-0
ACKSTS  15-151    16-136   31-15#
ACPUOP   6-0      6-0
ADDW0    6-0      6-0
ADDW1    6-0      6-0
ADDW10   6-0
ADDW11   6-0
ADDW12   6-0
ADDW13   6-0
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ADDW8    6-0
ADDW9    6-0
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ADEVM    6-0      6-0
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        13-D27#  13-D27#   13-E36   13-E36#  13-E36#
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CROSS REFERENCE TABLE (CREF V04.00)

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AMADR3    6-0       6-0
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AMAMS4    6-0       6-0
AMSGAD    6-0       6-0
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AMSGTY    6-0       6-0
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          50-86
APASS     6-0       6-0
APE       4-760#
APRIOR    6-0
APTCSU   40-1      48-1#
APTENV   40-1      42-1     48-1     48-1#
APTSIZ   10-23     48-1#
APTSPO   40-1      48-1     48-1#
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CROSS REFERENCE TABLE (CREF V04.00)

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AVECT2	6-0	6-0				

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	13-472#	13-480	13-480#	13-492	13-492#	13-501	13-501#	13-505	13-505#	13-505#	13-516	13-516#	13-522	13-522#
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	13-=92#	13->13	13->13#	13->26	13->26#	13->33	13->33#	13->37	13->37#	13->37#	13->39	13->39#	13->39#	13->41
	13->41#	13->41#	13->69	13->69#	13->82	13->82#	13->89	13->89#	13->93	13->93#	13->93#	13->95	13->95#	13->95#
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	13-a41#	13-a45	13-a45#	13-a45#	13-a47	13-a47#	13-a47#	13-a49	13-a49#	13-a49#	13-a53	13-a53#	13-a72	13-a72#
	13-a80	13-a80#	13-a88	13-a88#	13-A04	13-A04#	13-A11	13-A11#	13-A15	13-A15#	13-A15#	13-A24	13-A24#	13-A24#
	13-A28	13-A28#	13-A35	13-A35#	13-A42	13-A42#	13-A46	13-A46#	13-A46#	13-A55	13-A55#	13-A55#	13-A71	13-A71#
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CROSS REFERENCE TABLE (CREF V04.00)

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	13-E86#	13-E86#	13-E88	13-E88#	13-E88#									
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BAI	4-749#	25-556												
BB00	4-678#													
BB01	4-678#													
BB02	4-678#													
BB03	4-678#													
BB04	4-678#													
BB05	4-678#													
BB06	4-678#													
BB07	4-678#													
BB08	4-678#													
BB09	4-678#													
BIT0	4-492#	23-43												
BIT00	4-492	4-492#	4-504	4-551	4-569	4-588	4-625	4-643	4-678	4-752	4-770	41-1	41-1	42-1
	42-1													
BIT01	4-492	4-492#	4-503	4-550	4-587	4-624	4-642	4-678	4-752	4-769				
BIT02	4-492	4-492#	4-502	4-549	4-586	4-623	4-641	4-678	4-752	4-768				
BIT03	4-492	4-492#	4-501	4-548	4-585	4-622	4-640	4-678	4-690	4-749	4-767			
BIT04	4-492	4-492#	4-500	4-547	4-584	4-639	4-678	4-748						
BIT05	4-492	4-492#	4-499	4-583	4-621	4-638	4-678	4-689	4-747					
BIT06	4-492	4-492#	4-568	4-582	4-604	4-620	4-637	4-678	4-733	4-746	4-766			
BIT07	4-492	4-492#	4-567	4-581	4-603	4-619	4-636	4-661	4-678	4-688	4-732	4-745		
BIT08	4-492	4-492#	4-544	4-566	4-580	4-602	4-618	4-635	4-678	4-731	4-744	41-1		
BIT09	4-492	4-492#	4-543	4-565	4-579	4-601	4-617	4-634	4-660	4-678	4-730	4-743	41-1	41-1
	42-1	42-1												
BIT1	4-492#	16-312	17-26	25-576										
BIT10	4-492#	4-542	4-564	4-578	4-600	4-616	4-633	4-659	4-675	4-687	4-729	4-742	4-765	15-165
	42-1													
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	41-1													
BIT12	4-492#	4-562	4-576	4-614	4-631	4-657	4-673	4-685	4-740	4-763	15-111			
BIT13	4-492#	4-561	4-575	4-613	4-630	4-649	4-672	4-684	4-696	4-728	4-739	4-762	42-1	
BIT14	4-492#	4-560	4-574	4-612	4-629	4-648	4-671	4-683	4-695	4-727	4-738	4-761	15-73	41-1
BIT15	4-492#	4-559	4-573	4-611	4-628	4-647	4-670	4-682	4-694	4-726	4-737	4-760	18-33	18-90
BIT2	4-492#	23-43												
BIT3	4-492#	15-198	34-324	34-411										
BIT4	4-492#	15-140	34-430											
BIT5	4-492#													
BIT6	4-492#	15-87												
BIT7	4-492#	10-71	13-68	13-A97	13-B34	23-20								
BIT8	4-492#													
BIT9	4-492#													
BLNKS1	49-40#													
BLNKS2	10-121	11-34	11-48	49-39#										
BLNKS3	49-38#													
BLNKS4	10-82	49-37#												
BOTADR	43-73*	43-91*	43-94	43-109	43-153#									
BOTFLG	43-54*	43-101*	43-104	43-107*	43-154#									
BPTVEC	4-492#													
BSE	4-682#	13-C84	13-C91	16-224	25-427									
BUFFER	16-48*	16-292	61-2#	61-21										

CROSS REFERENCE TABLE (CREF V04.00)

```
BUFONE  13-41   13-138  13-153  13-241  13-251  13-344  13-469  13-555  13-565  13-658  13-783  13-880  13-957  13-:33
        13-;34  13-;99  13-<17  13-<82  13->08  13->64  13-?13  13-?63  13-a53  13-a58  13-a69  13-A68  13-B83  13-B98
        13-C00* 13-C02* 13-D37  13-D52  13-D54* 13-D56* 13-E44  13-E57* 61-3#
BUFTWO  13-118  13-138  13-221  13-241  13-409* 13-441  13-451  13-535  13-555  13-723* 13-753  13-763  13-;79  13-;99
        13-<62  13-<82  13-=01  13-=57  13-a28  13-a53  13-A33  13-B27  13-C36  13-D90  16-60   16-445  16-472  61-4#
CC       4-674#
CH       4-675#
CHGADR   7-0#   10-14*  10-17*  11-25   11-27*
CHRCNT  43-55*  43-78*  43-84*  43-85   43-88*  43-92   43-97*  43-108* 43-155#
CKSWR   41-1    42-1    42-1    46-1#
CLKADR   7-0#   13-68   13-A97  13-B34  22-6*   22-8    22-12*  22-14   23-20   23-39
CLKVCT   7-0#   22-7*   22-13*
CLR      4-747# 10-84   12-55   29-16
CLRSTS  15-98   30-22#
CMNSTA  10-130  12-2#
CMPBUF  13-138  13-241  13-555  13-;99  13-<82  13-a53  18-17#
CMPERR  26-21#
CNSL01  11-32   49-15#
CNSL02  11-40   49-16#
CNSL03  11-44   49-17#
CNSL04  11-54   49-18#
CNSL07  11-61   49-19#
CNSL08  11-92   49-21#
CNSL09  49-22#
CNTCLR  15-76   29-12#
COMMA   11-86   12-6    12-14   49-7#
CONT     4-637#
CPSAVE  41-1    41-1    41-1    41-1*   41-1*   42-1    42-1    42-1    42-1    42-1    42-1#   42-1*   42-1*   43-172
CR       4-492# 11-73   11-84   40-1    40-1    43-76   57-79
CRLF     4-492# 10-6    10-28   10-28   10-42   10-53   10-59   12-30   40-1    40-1    49-3    49-5    49-8    49-9
        49-10   49-11   49-12   49-13   49-14   49-15   49-16   49-18   49-19   49-20   49-21   49-22   49-23   49-25
        49-33   58-7    58-11   58-12   58-15   58-16   58-18   61-24   61-25   61-26   61-27   61-28   61-29   61-30
        61-31   61-32   61-33   61-34   61-35   61-36   61-37   61-38   61-39   61-40   61-41   61-42   61-43   61-44
        61-45   61-46   61-47   61-48   61-49   61-50   61-51   61-52   61-53   61-54   61-55   61-56   61-57   61-58
        61-59   61-60   61-61   61-62   61-63   61-64   61-65   61-66   61-67   61-68   61-69   61-70   61-71   61-72
        61-73
CTLFG    7-0#   12-47*  14-22   44-3*
CYLMSK   4-665#
DBCK     4-611#
DBEN     4-612#
DBL      4-765#
DCK      4-573#  4-590   16-221  18-23   25-496  25-516  34-417  34-420
DDISP    4-492#  6-0     10-23
DEBL     4-613#
DEVSEL  15-62   27-12#
DISPLA   6-0#   10-23*  10-23*  41-1*   42-1*
DISPRE   5-1#   10-23
DLT      4-737# 25-309  34-496  34-499
DMD      4-625#  4-643# 13-a84
DPE      4-690# 24-137  25-251  28-32   32-31   34-43   34-470  34-473
DPEHI    4-761#
DPELO    4-762#
DPR      4-566# 28-200  30-125  30-126  33-30
DRIVES  12-3    49-33#
DRQ      4-650#
DRVCLR   4-512# 16-86   33-18
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CROSS REFERENCE TABLE (CREF V04.00)

DRVSTS 16-104 33-9#
DRV 4-567# 24-104 25-34 25-37 25-38 28-200 30-125 30-126 33-30
DSWR 4-492# 6-0 10-23
DTASTS 13-111 13-132 13-213 13-235 13-310 13-330 13-403 13-431 13-528 13-549 13-624 13-644 13-717 13-745
13-842 13-862 13-937 13-:14 13-:95 13-;15 13-;72 13-;93 13-<55 13-<76 13-=36 13-=90 13->39 13->95
13-?44 13-@10 13-@47 13-B17 13-B58 13-C29 13-C61 13-C74 13-C87 13-D00 13-D83 13-E09 16-199 34-17#
DTE 4-576# 4-590 34-283 34-301 34-304
DTO 4-614#
DULPRT 4-653#
DVA 4-498# 10-89 20-43 21-37 24-65 24-68 27-37 30-31 33-17 33-18
DVC 4-688# 28-132 30-115 32-92 32-130 32-133 32-266 34-236 34-240 34-243 34-288 35-89 35-94 35-97
EARLY 52-107#
EBL 4-630#
ECH 4-582# 4-590 16-221 18-25 25-479 25-494 25-512 25-518 34-427 50-77 50-78 50-85 50-86
ECI 4-658# 18-21 25-514 34-424
ECRC 4-634#
ED1 55-1 59-1#
ED110 55-4 59-2#
ED111 55-5 59-3#
ED114 55-7 59-5#
ED223 55-8 59-6#
ED336 55-10 59-8#
ED337 55-11 55-12 59-10#
ED353 55-14 59-11#
EDT1 8-3 8-6 8-9 8-12 8-15 8-18 8-24 8-27 8-30 8-33 8-36 8-39 8-42 8-45
8-48 8-51 8-54 8-57 8-60 8-63 8-66 8-69 8-72 8-75 8-78 8-81 8-84 8-87
8-90 8-93 8-96 8-99 8-102 8-105 8-108 8-111 8-114 8-117 8-120 8-123 8-126 8-130
8-133 8-136 8-139 8-142 8-146 8-150 8-154 8-157 8-160 8-163 8-166 8-169 8-172 8-175
8-178 8-182 8-185 8-188 8-191 8-194 8-197 8-200 8-203 8-206 8-209 8-212 8-215 8-218
8-236 8-239 8-242 8-245 8-248 8-251 8-254 8-257 8-260 8-263 8-266 8-269 8-272 8-275
8-278 8-281 8-284 8-287 8-290 8-293 8-296 8-299 8-302 8-305 8-308 8-311 8-314 8-317
8-320 8-323 8-326 8-329 8-332 8-335 8-338 8-341 8-344 8-347 8-354 8-357 8-360 8-363
8-366 8-369 8-372 8-375 8-378 8-381 8-384 8-390 8-393 8-396 8-399 8-402 8-405 8-408
8-411 8-414 8-417 8-420 8-423 8-432 8-435 8-438 8-441 8-444 8-450 8-453 8-456 8-459
8-504 8-507 8-510 8-519 8-522 8-525 8-531 8-534 8-537 8-540 8-543 8-546 8-549 8-552
8-556 8-559 8-563 8-566 8-569 8-573 8-577 8-581 8-586 8-590 8-594 8-597 8-600 8-603
8-606 8-609 8-612 8-615 8-618 8-621 8-624 8-627 8-630 8-633 8-636 8-639 8-642 8-645
8-648 8-651 8-654 8-657 8-660 8-663 8-666 8-669 8-672 8-675 8-678 8-693 8-696 8-702
8-705 8-708 8-711 8-714 8-723 55-1#
EDT110 8-221 55-4#
EDT111 8-224 8-227 55-5#
EDT114 55-7#
EDT2 8-426 8-429 8-513 8-516 55-2#
EDT223 8-447 8-528 55-8#
EDT336 8-351 8-681 8-687 8-690 55-10#
EDT337 8-684 55-11#
EDT344 8-699 55-12#
EDT353 8-720 55-14#
EECC 4-639#
EF110 56-4 60-1#
EF111 56-1 56-5 60-2#
EF114 56-7 56-8 56-14 60-3#
EF336 56-10 56-11 56-12 60-4#
EF337 60-5#
EFT1 8-3 8-6 8-9 8-12 8-15 8-18 8-24 8-27 8-30 8-33 8-36 8-39 8-42 8-45
8-48 8-51 8-54 8-57 8-60 8-63 8-66 8-69 8-72 8-75 8-78 8-81 8-84 8-87

CROSS REFERENCE TABLE (CREF V04.00)

	8-90	8-93	8-96	8-99	8-102	8-105	8-108	8-111	8-114	8-117	8-120	8-123	8-126	8-130
	8-133	8-136	8-139	8-142	8-146	8-150	8-154	8-157	8-160	8-163	8-166	8-169	8-172	8-175
	8-178	8-182	8-185	8-188	8-191	8-194	8-197	8-200	8-203	8-206	8-209	8-212	8-215	8-218
	8-236	8-239	8-242	8-245	8-248	8-251	8-254	8-257	8-260	8-263	8-266	8-269	8-272	8-275
	8-278	8-281	8-284	8-287	8-290	8-293	8-296	8-299	8-302	8-305	8-308	8-311	8-314	8-317
	8-320	8-323	8-326	8-329	8-332	8-335	8-338	8-341	8-344	8-347	8-354	8-357	8-360	8-363
	8-366	8-369	8-372	8-375	8-378	8-381	8-384	8-390	8-393	8-396	8-399	8-402	8-405	8-408
	8-411	8-414	8-417	8-420	8-423	8-432	8-435	8-438	8-441	8-444	8-450	8-453	8-456	8-459
	8-504	8-507	8-510	8-519	8-522	8-525	8-531	8-534	8-537	8-540	8-543	8-546	8-549	8-552
	8-556	8-559	8-563	8-566	8-569	8-573	8-577	8-581	8-586	8-590	8-594	8-597	8-600	8-603
	8-606	8-609	8-612	8-615	8-618	8-621	8-624	8-627	8-630	8-633	8-636	8-639	8-642	8-645
	8-648	8-651	8-654	8-657	8-660	8-663	8-666	8-669	8-672	8-675	8-678	8-693	8-696	8-702
	8-705	8-708	8-711	8-714	8-723	56-1#								
EFT110	8-221	56-4#												
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EFT114	56-7#													
EFT2	8-426	8-429	8-513	8-516	56-2#									
EFT223	8-447	8-528	56-8#											
EFT336	8-351	8-681	8-687	8-690	56-10#									
EFT337	8-684	56-11#												
EFT344	8-699	56-12#												
EFT353	8-720	56-14#												
EH1	54-1	58-1#												
EH110	54-4	58-2#												
EH111	54-5	58-3#												
EH114	54-7	58-5#												
EH223	54-8	58-6#												
EH256	54-9	58-7#												
EH336	54-11	58-10#												
EH337	54-12	58-11#												
EH344	54-13	58-15#												
EH353	54-15	58-18#												
EHT1	8-3	8-6	8-9	8-12	8-15	8-18	8-24	8-27	8-30	8-33	8-36	8-39	8-42	8-45
	8-48	8-51	8-54	8-57	8-60	8-63	8-66	8-69	8-72	8-75	8-78	8-81	8-84	8-87
	8-90	8-93	8-96	8-99	8-102	8-105	8-108	8-111	8-114	8-117	8-120	8-123	8-126	8-130
	8-133	8-136	8-139	8-142	8-146	8-150	8-154	8-157	8-160	8-163	8-166	8-169	8-172	8-175
	8-178	8-182	8-185	8-188	8-191	8-194	8-197	8-200	8-203	8-206	8-209	8-212	8-215	8-218
	8-236	8-239	8-242	8-245	8-248	8-251	8-254	8-257	8-260	8-263	8-266	8-269	8-272	8-275
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	8-411	8-414	8-417	8-420	8-423	8-432	8-435	8-438	8-441	8-444	8-450	8-453	8-456	8-459
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	8-606	8-609	8-612	8-615	8-618	8-621	8-624	8-627	8-630	8-633	8-636	8-639	8-642	8-645
	8-648	8-651	8-654	8-657	8-660	8-663	8-666	8-669	8-672	8-675	8-678	8-693	8-696	8-702
	8-705	8-708	8-711	8-714	8-723	54-1#								
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EHT223	8-447	54-8#												
EHT256	8-528	54-9#												
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EHT337	8-684	54-12#												
EHT344	8-699	54-13#												

CROSS REFERENCE TABLE (CREF V04.00)

EHT353 8-720 54-15#
EMS1 53-3 57-3#
EMS10 53-7 53-11 57-10#
EMS100 53-39 53-71 53-176 53-196 57-66#
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EMS102 53-177 53-178 53-181 53-182 53-183 53-184 53-186 53-187 53-188 53-189 53-234 53-235 57-68#
EMS103 53-56 53-57 53-135 53-141 53-196 53-197 53-198 53-203 53-204 53-205 53-206 53-207 53-208 53-209
53-210 53-211 53-213 53-214 53-215 53-219 53-220 57-69#
EMS104 53-136 53-180 53-203 57-70#
EMS105 53-204 57-71#
EMS106 53-212 53-232 57-72#
EMS11 53-12 53-15 53-16 53-17 53-18 53-19 53-20 53-21 53-22 53-23 53-24 53-25 53-26 53-27
53-28 53-29 53-30 53-31 53-32 53-33 53-43 53-152 53-177 57-11#
EMS110 53-9 53-74 53-77 57-73#
EMS111 53-74 53-226 57-74#
EMS112 53-74 57-75#
EMS113 53-75 53-76 53-127 57-77#
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53-73 53-77 53-107 53-108 53-109 53-110 53-134 53-137 53-139 53-140 53-142 53-150 53-151 53-153
53-179 53-182 53-183 53-185 53-186 53-187 53-188 53-189 53-190 53-192 53-193 53-194 53-195 53-201
53-205 53-221 53-222 53-223 53-232 53-234 57-79#
EMS116 53-74 53-77 53-191 53-225 57-80#
EMS117 53-77 53-143 53-148 53-149 53-150 53-178 53-185 53-201 53-225 53-228 53-229 53-230 53-231 57-81#
EMS12 53-12 57-12#
EMS120 57-82#
EMS121 53-79 53-88 53-97 53-99 57-83#
EMS122 53-80 53-89 57-84#
EMS123 53-81 53-88 53-89 53-90 53-90 53-91 53-92 53-93 53-94 53-95 53-96 53-98 53-126 57-85#
EMS124 53-56 53-82 53-91 53-101 57-86#
EMS125 53-83 53-92 53-102 53-169 57-87#
EMS126 53-84 53-93 53-103 57-88#
EMS127 57-89#
EMS13 53-13 53-42 53-216 57-13#
EMS130 53-86 53-95 53-106 57-90#
EMS131 53-87 53-96 53-104 57-91#
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53-93 53-94 53-95 53-96 53-97 53-98 53-99 53-100 53-101 53-102 53-103 53-104 53-105 53-106
53-125 53-126 53-168 53-169 57-92#
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EMS143 53-47 53-65 53-73 53-108 53-109 53-110 53-133 53-140 53-184 53-202 53-205 57-101#
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EMS146 53-109 53-185 53-190 53-201 57-104#
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EMS15 53-13 53-42 53-216 57-15#
EMS150 53-50 53-51 53-54 53-63 53-67 53-111 53-134 53-138 53-182 53-183 53-194 53-195 53-223 53-234
57-106#

EMS151 53-69 53-112 53-113 53-173 53-217 57-107#
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EMS153 53-111 57-109#
EMS154 53-111 53-112 53-123 53-124 57-110#
EMS155 53-112 53-124 57-111#
EMS156 53-113 53-114 53-115 53-116 53-151 53-173 57-112#
EMS157 53-113 53-123 57-113#
EMS16 53-13 57-16#
EMS160 53-114 53-115 53-116 57-114#
EMS161 53-114 57-115#
EMS162 57-116#
EMS163 53-58 53-59 53-60 53-61 53-62 53-63 53-64 53-65 53-66 53-67 53-68 53-69 53-70 53-71
53-72 53-73 53-117 53-143 57-117#
EMS164 53-45 57-118#
EMS165 53-56 53-57 53-71 53-72 53-172 53-196 53-197 53-198 57-120#
EMS166 53-142 57-121#
EMS167 53-8 53-49 53-68 53-123 53-124 53-168 53-169 53-170 53-175 53-235 57-122#
EMS17 53-14 57-17#
EMS170 53-9 57-123#
EMS171 53-57 53-105 53-125 53-126 57-124#
EMS172 53-215 57-125#
EMS173 53-214 57-126#
EMS174 53-216 57-127#
EMS175 53-216 53-217 53-218 53-219 57-128#
EMS176 57-129#
EMS177 53-127 57-130#
EMS2 53-4 53-5 57-4#
EMS20 53-34 53-53 53-58 53-110 53-118 53-119 53-120 53-121 53-212 53-232 53-238 57-18#
EMS200 53-128 57-131#
EMS201 53-128 57-132#
EMS202 53-122 53-130 53-131 53-132 53-133 53-134 53-136 53-180 57-133#
EMS203 53-122 53-130 53-131 53-132 53-133 53-174 53-175 53-176 53-237 57-134#
EMS204 53-131 57-135#
EMS205 53-55 53-142 53-179 53-233 57-136#
EMS206 53-55 53-142 53-170 53-179 53-233 57-137#
EMS207 53-168 53-170 57-138#
EMS21 53-15 57-19#
EMS210 53-169 53-170 53-173 57-139#
EMS211 53-170 57-140#
EMS212 53-171 53-172 57-141#
EMS213 53-171 57-142#
EMS214 53-55 57-143#
EMS215 53-236 57-144#
EMS216 53-237 57-145#
EMS217 53-237 57-146#
EMS22 53-16 57-20#
EMS220 53-179 57-147#
EMS221 53-231 53-238 57-148#
EMS222 53-233 57-149#
EMS223 53-232 57-150#
EMS224 53-121 57-151#
EMS225 53-53 53-150 53-151 53-153 57-152#
EMS226 53-53 53-150 53-153 57-153#
EMS227 53-151 57-154#
EMS23 53-17 57-21#
EMS230 53-151 53-152 53-153 57-155#

CROSS REFERENCE TABLE (CREF V04.00)

EMS231 53-151 57-156#
EMS232 57-157#
EMS24 53-18 57-22#
EMS25 53-19 53-115 57-23#
EMS26 53-20 53-116 53-173 57-24#
EMS27 53-16 53-19 53-20 53-115 53-116 53-173 57-25#
EMS3 53-4 53-76 57-5#
EMS30 53-17 53-18 53-21 53-22 53-23 53-24 53-25 53-26 53-27 53-28 53-29 53-30 53-31 53-32
53-33 53-43 53-122 53-130 53-131 53-132 53-133 53-144 53-145 53-146 53-147 53-152 53-174 53-175
53-176 53-177 53-199 57-26#
EMS31 53-21 53-146 53-207 53-208 57-27#
EMS32 53-22 57-28#
EMS33 53-23 53-219 57-29#
EMS34 53-24 53-225 53-226 53-227 57-30#
EMS35 53-25 53-216 57-31#
EMS36 53-26 53-213 53-214 53-215 57-32#
EMS37 53-27 57-33#
EMS4 53-5 53-75 57-6#
EMS40 53-28 53-220 57-34#
EMS41 53-29 53-190 53-191 57-35#
EMS42 53-30 53-206 57-36#
EMS43 53-31 53-209 57-37#
EMS44 53-32 53-211 53-230 57-38#
EMS45 53-33 53-210 53-229 57-39#
EMS46 53-43 53-58 53-120 53-145 53-177 53-185 53-199 53-201 57-40#
EMS47 53-37 53-44 53-45 53-52 53-60 53-61 53-66 53-117 53-118 53-147 53-186 53-187 53-188 53-192
53-193 53-222 57-41#
EMS5 53-6 53-7 57-7#
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57-42#
EMS51 53-48 53-55 53-70 53-130 53-139 53-142 53-179 53-189 53-221 57-43#
EMS52 53-55 53-142 53-143 53-148 53-149 53-150 53-178 53-179 53-185 53-201 53-228 53-229 53-230 53-231
53-233 57-44#
EMS53 53-37 53-38 53-39 53-40 53-44 53-45 53-46 53-47 53-62 53-64 53-65 53-73 53-140 53-141
53-181 53-182 53-184 53-186 53-187 53-190 53-191 53-192 53-193 53-194 53-195 53-200 53-202 53-203
53-204 53-206 53-207 53-216 53-218 53-219 53-220 53-226 57-45#
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EMS55 53-227 57-47#
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EMS6 53-6 57-8#
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EMS61 53-224 57-51#
EMS62 53-224 57-52#
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EMS65 53-41 57-55#
EMS66 53-34 53-218 57-56#
EMS67 53-43 53-44 53-45 53-46 53-47 53-48 53-49 53-50 53-51 53-52 53-54 57-57#
EMS7 53-10 57-9#
EMS70 53-48 53-50 53-52 53-54 53-66 53-70 53-73 53-107 53-110 53-139 53-182 53-189 53-194 53-205
53-221 57-58#
EMS71 53-51 53-59 53-63 53-183 53-195 53-208 57-59#

CROSS REFERENCE TABLE (CREF V04.00)

EMS72	53-36	53-48	53-51	53-55	53-56	53-57	53-60	53-61	53-61	53-63	53-108	53-109	53-134	53-135
	53-139	53-140	53-142	53-153	53-179	53-183	53-187	53-193	53-195	53-232	57-60#			
EMS73	53-49	53-54	53-67	53-68	53-136	53-180	53-188	53-222	53-223	53-234	53-235	57-61#		
EMS74	53-69	53-70	53-134	53-189	53-217	53-221	57-62#							
EMS75	53-35	53-66	53-67	53-137	53-138	53-[illegible]	53-222	53-223	53-234	57-63#				
EMS76	53-35	53-36	53-37	53-38	53-39	53-40	57-64#							
EMS77	53-38	53-72	53-148	53-198	57-65#									
EMT1	8-3	53-3#												
EMT10	8-24	53-10#												
EMT100	8-197	53-66#												
EMT101	8-200	53-67#												
EMT102	8-203	53-68#												
EMT103	8-206	53-69#												
EMT104	8-209	53-70#												
EMT105	8-212	53-71#												
EMT106	8-215	53-72#												
EMT107	8-218	53-73#												
EMT11	8-27	53-11#												
EMT110	8-221	53-74#												
EMT111	8-224	53-75#												
EMT112	8-227	53-76#												
EMT113	8-230	53-77#												
EMT114	53-78#													
EMT115	8-236	53-79#												
EMT116	8-239	53-80#												
EMT117	8-242	53-81#												
EMT12	8-30	53-12#												
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EMT123	8-254	53-85#												
EMT124	8-257	53-86#												
EMT125	8-260	53-87#												
EMT126	8-263	53-88#												
EMT127	8-266	53-89#												
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EMT131	8-272	53-91#												
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EMT133	8-278	53-93#												
EMT134	8-281	53-94#												
EMT135	8-284	53-95#												
EMT136	8-287	53-96#												
EMT137	8-290	53-97#												
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EMT140	8-293	53-98#												
EMT141	8-296	53-99#												
EMT142	8-299	53-100#												
EMT143	8-302	53-101#												
EMT144	8-305	53-102#												
EMT145	8-308	53-103#												
EMT146	8-311	53-104#												
EMT147	8-314	53-105#												
EMT15	8-39	53-15#												
EMT150	8-317	53-106#												
EMT151	8-320	53-107#												

CROSS REFERENCE TABLE (CREF V04.00)

EMT152 8-323 53-108#
EMT153 8-326 53-109#
EMT154 8-329 53-110#
EMT155 8-332 53-111#
EMT156 8-335 53-112#
EMT157 8-338 53-113#
EMT16 8-42 53-16#
EMT160 8-341 53-114#
EMT161 8-344 53-115#
EMT162 8-347 53-116#
EMT163 53-117#
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EMT165 8-357 53-119#
EMT166 8-360 53-120#
EMT167 8-363 53-121#
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EMT171 8-369 53-123#
EMT172 8-372 53-124#
EMT173 8-375 53-125#
EMT174 8-378 53-126#
EMT175 8-381 53-127#
EMT176 8-384 53-128#
EMT177 53-129#
EMT2 8-6 53-4#
EMT20 8-48 53-18#
EMT200 8-390 53-130#
EMT201 8-393 53-131#
EMT202 8-396 53-132#
EMT203 8-399 53-133#
EMT204 8-402 53-134#
EMT205 8-405 53-135#
EMT206 8-408 53-136#
EMT207 8-411 53-137#
EMT21 8-51 53-19#
EMT210 8-414 53-138#
EMT211 8-417 53-139#
EMT212 8-420 53-140#
EMT213 8-423 53-141#
EMT214 8-426 53-142#
EMT215 8-429 53-143#
EMT216 8-432 53-144#
EMT217 8-435 53-145#
EMT22 8-54 53-20#
EMT220 8-438 53-146#
EMT221 8-441 53-147#
EMT222 8-444 53-148#
EMT223 8-447 53-149#
EMT224 8-450 53-150#
EMT225 8-453 53-151#
EMT226 8-456 53-152#
EMT227 8-459 53-153#
EMT23 8-57 53-21#
EMT230 8-462 53-154#
EMT231 8-465 53-155#
EMT232 8-468 53-156#

CROSS REFERENCE TABLE (CREF V04.00)

EMT233	8-471	53-157#
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EMT235	53-159#	
EMT236	53-160#	
EMT237	53-161#	
EMT24	8-60	53-22#
EMT240	53-162#	
EMT241	53-163#	
EMT242	53-164#	
EMT243	53-165#	
EMT244	53-166#	
EMT245	53-167#	
EMT246	8-504	53-168#
EMT247	8-507	53-169#
EMT25	8-63	53-23#
EMT250	8-510	53-170#
EMT251	8-513	53-171#
EMT252	8-516	53-172#
EMT253	8-519	53-173#
EMT254	8-522	53-174#
EMT255	8-525	53-175#
EMT256	8-528	53-176#
EMT257	8-531	53-177#
EMT26	8-66	53-24#
EMT260	8-534	53-178#
EMT261	8-537	53-179#
EMT262	8-540	53-180#
EMT263	8-543	53-181#
EMT264	8-546	53-182#
EMT265	8-549	53-183#
EMT266	8-552	53-184#
EMT267	8-556	53-185#
EMT27	8-69	53-25#
EMT270	8-559	53-186#
EMT271	8-563	53-187#
EMT272	8-566	53-188#
EMT273	8-569	53-189#
EMT274	8-573	53-190#
EMT275	8-577	53-191#
EMT276	8-581	53-192#
EMT277	8-586	53-193#
EMT3	8-9	53-5#
EMT30	8-72	53-26#
EMT300	8-590	53-194#
EMT301	8-594	53-195#
EMT302	8-597	53-196#
EMT303	8-600	53-197#
EMT304	8-603	53-198#
EMT305	8-606	53-199#
EMT306	8-609	53-200#
EMT307	8-612	53-201#
EMT31	8-75	53-27#
EMT310	8-615	53-202#
EMT311	8-618	53-203#
EMT312	8-621	53-204#
EMT313	8-624	53-205#

CROSS REFERENCE TABLE (CREF V04.00)

EMT314	8-627	53-206#	
EMT315	8-630	53-207#	
EMT316	8-633	53-208#	
EMT317	8-636	53-209#	
EMT32	8-78	53-28#	
EMT320	8-639	53-210#	
EMT321	8-642	53-211#	
EMT322	8-645	53-212#	
EMT323	8-648	53-213#	
EMT324	8-651	53-214#	
EMT325	8-654	53-215#	
EMT326	8-657	53-216#	
EMT327	8-660	53-217#	
EMT33	8-81	53-29#	
EMT330	8-663	53-218#	
EMT331	8-666	53-219#	
EMT332	8-669	53-220#	
EMT333	8-672	53-221#	
EMT334	8-675	53-222#	
EMT335	8-678	53-223#	
EMT336	8-351	8-681	53-224#
EMT337	8-684	53-225#	
EMT34	8-84	53-30#	
EMT340	8-687	53-226#	
EMT341	8-690	53-227#	
EMT342	8-693	53-228#	
EMT343	8-696	53-229#	
EMT344	8-699	53-230#	
EMT345	8-702	53-231#	
EMT346	8-705	53-232#	
EMT347	8-708	53-233#	
EMT35	8-87	53-31#	
EMT350	8-711	53-234#	
EMT351	8-714	53-235#	
EMT352	8-717	53-236#	
EMT353	8-720	53-237#	
EMT354	8-723	53-238#	
EMT36	8-90	53-32#	
EMT37	8-93	53-33#	
EMT4	8-12	53-6#	
EMT40	8-96	53-34#	
EMT41	8-99	53-35#	
EMT42	8-102	53-36#	
EMT43	8-105	53-37#	
EMT44	8-108	53-38#	
EMT45	8-111	53-39#	
EMT46	8-114	53-40#	
EMT47	8-117	53-41#	
EMT5	8-15	53-7#	
EMT50	8-120	53-42#	
EMT51	8-123	53-43#	
EMT52	8-126	53-44#	
EMT53	8-130	53-45#	
EMT54	8-133	53-46#	
EMT55	8-136	53-47#	
EMT56	8-139	53-48#	

CROSS REFERENCE TABLE (CREF V04.00)

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EMT60    8-146   53-50#
EMT61    8-150   53-51#
EMT62    8-154   53-52#
EMT63    8-157   53-53#
EMT64    8-160   53-54#
EMT65    8-163   53-55#
EMT66    8-166   53-56#
EMT67    8-169   53-57#
EMT7     8-21    53-9#
EMT70    8-172   53-58#
EMT71    8-175   53-59#
EMT72    8-178   53-60#
EMT73    8-182   53-61#
EMT74    8-185   53-62#
EMT75    8-188   53-63#
EMT76    8-191   53-64#
EMT77    8-194   53-65#
EMTVEC   4-492#  10-23*  10-23*
ENRGDT   52-144#
EQUALS   49-4#
ERR      4-560#  25-80   25-82   25-98   25-132
ERRNMB   43-40*  43-41*  43-44   43-49   43-56   43-152#
ERROR    4-492#
ERRTYP   42-1    43-13#
ERRVEC   4-492#  10-23   10-23*  10-23*  10-25*  10-26*  13-5    13-5    13-6*   13-7*   13-20*  13-20*  13-24*  13-24*
         20-35   20-35   20-39*  20-40*  20-70*  20-70*  21-29   21-29   21-33*  21-34*  21-63*  21-63*  22-3    22-3
         22-4*   22-5*   22-11*  22-18*  22-18*  23-9    23-9    23-10*  23-11*  23-31*  23-31*  27-20   27-20   27-21*
         27-22*  27-51*  27-51*  29-12   29-12   29-13*  29-14*  29-25*  29-25*  41-1    41-1    41-1*   41-1*   41-1*
         41-1*   41-1*   42-1    42-1*   42-1*
ERTY00   43-21   43-157#
ERTY01   43-38   43-158#
ERTY02   43-43   43-159#
ERTY03   43-45   43-160#
ERTY04   43-144  43-161#
ERTY05   43-31   43-162#
ESRC     4-632#
F0       4-503#  25-28
F1       4-502#  25-28
F2       4-501#  25-28   25-675
F3       4-500#  25-28
F4       4-499#  25-28
FER      4-584#   4-590  13-B55  13-B62  13-C58  13-C65  16-221  25-412  34-352  34-369  34-372  34-395  34-398
FIND     13-44   13-44#  13-44#  13-52   13-52#  13-52#  13-64   13-64#  13-64#  13-75   13-75#  13-75#  13-84   13-84#
         13-84#  13-88   13-88#  13-88#  13-99   13-99#  13-99#  13-105  13-105#  13-105#  13-109  13-109#  13-109#  13-111
         13-111#  13-111#  13-113  13-113#  13-113#  13-120  13-120#  13-120#  13-126  13-126#  13-126#  13-130  13-130#  13-130#
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         13-312  13-312#  13-312#  13-318  13-318#  13-318#  13-324  13-324#  13-324#  13-328  13-328#  13-328#  13-330  13-330#
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CROSS REFERENCE TABLE (CREF V04.00)

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	13-492#	13-492#	13-501	13-501#	13-501#	13-505	13-505#	13-505#	13-516	13-516#	13-516#	13-522	13-522#	13-522#
	13-526	13-526#	13-526#	13-528	13-528#	13-528#	13-530	13-530#	13-530#	13-537	13-537#	13-537#	13-543	13-543#
	13-543#	13-547	13-547#	13-547#	13-549	13-549#	13-549#	13-551	13-551#	13-551#	13-555	13-555#	13-555#	13-568
	13-568#	13-568#	13-576	13-576#	13-576#	13-588	13-588#	13-588#	13-597	13-597#	13-597#	13-601	13-601#	13-601#
	13-612	13-612#	13-612#	13-618	13-618#	13-618#	13-622	13-622#	13-622#	13-624	13-624#	13-624#	13-626	13-626#
	13-626#	13-632	13-632#	13-632#	13-638	13-638#	13-638#	13-642	13-642#	13-642#	13-644	13-644#	13-644#	13-646
	13-646#	13-646#	13-661	13-661#	13-661#	13-669	13-669#	13-669#	13-681	13-681#	13-681#	13-690	13-690#	13-690#
	13-694	13-694#	13-694#	13-705	13-705#	13-705#	13-711	13-711#	13-711#	13-715	13-715#	13-715#	13-717	13-717#
	13-717#	13-719	13-719#	13-719#	13-728	13-728#	13-728#	13-734	13-734#	13-734#	13-738	13-738#	13-738#	13-745
	13-745#	13-745#	13-761	13-761#	13-761#	13-786	13-786#	13-786#	13-794	13-794#	13-794#	13-806	13-806#	13-806#
	13-815	13-815#	13-815#	13-819	13-819#	13-819#	13-830	13-830#	13-830#	13-836	13-836#	13-836#	13-840	13-840#
	13-840#	13-842	13-842#	13-842#	13-844	13-844#	13-844#	13-850	13-850#	13-850#	13-856	13-856#	13-856#	13-860
	13-860#	13-860#	13-862	13-862#	13-862#	13-864	13-864#	13-864#	13-884	13-884#	13-884#	13-896	13-896#	13-896#
	13-905	13-905#	13-905#	13-909	13-909#	13-909#	13-920	13-920#	13-920#	13-926	13-926#	13-926#	13-935	13-935#
	13-935#	13-937	13-937#	13-937#	13-939	13-939#	13-939#	13-961	13-961#	13-961#	13-973	13-973#	13-973#	13-982
	13-982#	13-982#	13-986	13-986#	13-986#	13-997	13-997#	13-997#	13-:03	13-:03#	13-:03#	13-:12	13-:12#	13-:12#
	13-:14	13-:14#	13-:14#	13-:16	13-:16#	13-:16#	13-:36	13-:36#	13-:36#	13-:44	13-:44#	13-:44#	13-:58	13-:58#
	13-:58#	13-:67	13-:67#	13-:67#	13-:71	13-:71#	13-:71#	13-:83	13-:83#	13-:83#	13-:89	13-:89#	13-:89#	13-:93
	13-:93#	13-:93#	13-:95	13-:95#	13-:95#	13-:97	13-:97#	13-:97#	13-;03	13-;03#	13-;03#	13-;09	13-;09#	13-;09#
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	13-;74#	13-;74#	13-;81	13-;81#	13-;81#	13-;87	13-;87#	13-;87#	13-;91	13-;91#	13-;91#	13-;93	13-;93#	13-;93#
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	13-<42#	13-<49	13-<49#	13-<49#	13-<53	13-<53#	13-<53#	13-<55	13-<55#	13-<55#	13-<57	13-<57#	13-<57#	13-<64
	13-<64#	13-<64#	13-<70	13-<70#	13-<70#	13-<74	13-<74#	13-<74#	13-<76	13-<76#	13-<76#	13-<78	13-<78#	13-<78#
	13-<82	13-<82#	13-<82#	13-=05	13-=05#	13-=05#	13-=18	13-=18#	13-=18#	13-=25	13-=25#	13-=25#	13-=34	13-=34#
	13-=34#	13-=36	13-=36#	13-=36#	13-=38	13-=38#	13-=38#	13-=61	13-=61#	13-=61#	13-=72	13-=72#	13-=72#	13-=79
	13-=79#	13-=79#	13-=88	13-=88#	13-=88#	13-=90	13-=90#	13-=90#	13-=92	13-=92#	13-=92#	13->13	13->13#	13->13#
	13->26	13->26#	13->26#	13->33	13->33#	13->33#	13->37	13->37#	13->37#	13->39	13->39#	13->39#	13->41	13->41#
	13->41#	13->69	13->69#	13->69#	13->82	13->82#	13->82#	13->89	13->89#	13->89#	13->93	13->93#	13->93#	13->95
	13->95#	13->95#	13->97	13->97#	13->97#	13-?18	13-?18#	13-?18#	13-?31	13-?31#	13-?31#	13-?38	13-?38#	13-?38#
	13-?42	13-?42#	13-?42#	13-?44	13-?44#	13-?44#	13-?46	13-?46#	13-?46#	13-?66	13-?66#	13-?66#	13-?74	13-?74#
	13-?74#	13-?86	13-?86#	13-?86#	13-?97	13-?97#	13-?97#	13-a04	13-a04#	13-a04#	13-a08	13-a08#	13-a08#	13-a10
	13-a10#	13-a10#	13-a12	13-a12#	13-a12#	13-a23	13-a23#	13-a23#	13-a35	13-a35#	13-a35#	13-a41	13-a41#	13-a41#
	13-a45	13-a45#	13-a45#	13-a47	13-a47#	13-a47#	13-a49	13-a49#	13-a49#	13-a53	13-a53#	13-a53#	13-a72	13-a72#
	13-a72#	13-a80	13-a80#	13-a80#	13-a88	13-a88#	13-a88#	13-A04	13-A04#	13-A04#	13-A11	13-A11#	13-A11#	13-A15
	13-A15#	13-A15#	13-A24	13-A24#	13-A24#	13-A28	13-A28#	13-A28#	13-A35	13-A35#	13-A35#	13-A42	13-A42#	13-A42#
	13-A46	13-A46#	13-A46#	13-A55	13-A55#	13-A55#	13-A71	13-A71#	13-A71#	13-A79	13-A79#	13-A79#	13-A93	13-A93#
	13-A93#	13-B04	13-B04#	13-B04#	13-B11	13-B11#	13-B11#	13-B15	13-B15#	13-B15#	13-B17	13-B17#	13-B17#	13-B19
	13-B19#	13-B19#	13-B30	13-B30#	13-B30#	13-B41	13-B41#	13-B41#	13-B47	13-B47#	13-B47#	13-B51	13-B51#	13-B51#
	13-B58	13-B58#	13-B58#	13-B65	13-B65#	13-B65#	13-B86	13-B86#	13-B86#	13-B94	13-B94#	13-B94#	13-C16	13-C16#
	13-C16#	13-C23	13-C23#	13-C23#	13-C27	13-C27#	13-C27#	13-C29	13-C29#	13-C29#	13-C31	13-C31#	13-C31#	13-C38
	13-C38#	13-C38#	13-C44	13-C44#	13-C44#	13-C48	13-C48#	13-C48#	13-C61	13-C61#	13-C61#	13-C74	13-C74#	13-C74#
	13-C87	13-C87#	13-C87#	13-D00	13-D00#	13-D00#	13-D12	13-D12#	13-D12#	13-D40	13-D40#	13-D40#	13-D48	13-D48#
	13-D48#	13-D70	13-D70#	13-D70#	13-D77	13-D77#	13-D77#	13-D81	13-D81#	13-D81#	13-D83	13-D83#	13-D83#	13-D85
	13-D85#	13-D85#	13-D92	13-D92#	13-D92#	13-D98	13-D98#	13-D98#	13-E02	13-E02#	13-E02#	13-E09	13-E09#	13-E09#
	13-E21	13-E21#	13-E21#	13-E47	13-E47#	13-E47#	13-E61	13-E61#	13-E61#	13-E75	13-E75#	13-E75#	13-E78	13-E78#
	13-E80	13-E80#	13-E82	13-E82#	13-E82#	13-E86	13-E86#	13-E86#	13-E88	13-E88#	13-E88#			
FMT16	4-657#	13-140	13-142	13-151	13-249	13-342	13-467	13-563	13-656	13-778	13-876	13-953	13-:31	13-;31
	13-<14	13-<97	13-=53	13->49	13->52	13->62	13-?11	13-?61	13-a67	13-A65	13-B26	13-B67	13-B79	13-C54
	13-D35	13-E42	16-59	16-274	16-283	17-32	17-34	18-27	25-447	28-59	34-183			
FNCDTB	25-126	25-442	50-55#											
FNCMSK	4-505#	33-17	34-345											
GENBUF	13-48	13-160	13-258	13-351	13-476	13-572	13-665	13-790	13-:40	13-;41	13-<24	13-?70	13-a76	13-A75

CROSS REFERENCE TABLE (CREF V04.00)

	13-B90	13-D44	13-E53	17-20#										
GET	13-84	13-105	13-126	13-185	13-207	13-229	13-283	13-304	13-324	13-376	13-397	13-420	13-449	13-501
	13-522	13-543	13-597	13-618	13-638	13-690	13-711	13-734	13-761	13-815	13-836	13-856	13-905	13-926
	13-982	13-:03	13-:67	13-:89	13-;09	13-;66	13-;87	13-<49	13-<70	13-=25	13-=79	13->33	13->89	13-?38
	13-@04	13-@41	13-A11	13-A42	13-B11	13-B47	13-C23	13-C44	13-D77	13-D98	13-E82	15-47	15-90	15-114
	15-143	15-170	15-201	16-75	16-96	16-128	16-162	16-191	20-31#					
GETBUF	7-0#	20-37												
GETINX	7-0#	13-446*	13-447*	13-758*	13-759*	19-13	20-38							
GETSSF	16-270	16-444#												
GETSTS	13-79	13-180	13-278	13-371	13-496	13-592	13-685	13-810	13-900	13-977	13-:62	13-;63	13-<46	13-=22
	13-=76	13->30	13->86	13-?35	13-@01	13-A08	13-A39	13-B08	13-C20	13-D74	13-E78	15-46	16-74	19-10#
GNS	5-1	5-1	10-6	10-28	10-42	10-53	10-59	12-30	14-20	14-20	46-1	46-1	46-1	46-1
	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1
	46-1	46-1	46-1	46-1	46-1	46-1	46-1	46-1						
GO	4-504#	13-73	13-92	13-117	13-168	13-194	13-220	13-266	13-291	13-316	13-359	13-384	13-412	13-484
	13-509	13-534	13-580	13-605	13-630	13-673	13-698	13-726	13-798	13-823	13-848	13-888	13-913	13-965
	13-990	13-:50	13-:76	13-;01	13-;49	13-;78	13-<32	13-<61	13-=02	13-=58	13->09	13->65	13-?14	13-?64
	13-?78	13-?90	13-@15	13-@27	13-@92	13-A32	13-B02	13-B39	13-C06	13-C35	13-D60	13-D89	13-E65	15-125
	15-183	16-86	16-118	16-152	16-181	23-17	24-90	24-102	24-107	24-123	25-47	25-50	34-346	
GTSWR	10-28	46-1#												
HCE	4-581#	4-590	13-C97	13-D04	13-E06	13-E13	16-221	25-375	25-380	25-395	25-397	25-410	25-425	25-451
	25-456	34-352	34-382	34-385	34-395	34-398	50-77	50-78	50-81	50-85	50-86			
HCI	4-659#	25-373	34-348											
HCRC	4-580#	4-590	16-221	25-382	34-352	34-356	34-359	34-395	34-398					
HELP	11-17	61-23#												
HT	4-492#	40-1	40-1	43-82										
IAE	4-578#	25-279	25-651	25-667	25-694	28-48	28-72	32-24	32-78	32-81	34-172	34-194	50-59	50-69
	50-77	50-78	50-81	50-82	50-85	50-86								
IBSAVE	42-1	42-1	42-1	42-1	42-1	42-1#	42-1*	42-1*	42-1*					
IDXMSK	4-720#	20-51	20-54	21-45	21-48									
IE	4-733#	4-766#												
ILF	4-588#	25-151	25-153	31-51	31-111	31-115	32-24	32-45	32-48	34-128	34-145	34-148	50-58	50-67
	50-68	50-70	50-71	50-72	50-73	50-74	50-75	50-76	50-79	50-80	50-83	50-84	50-87	50-88
ILF02	4-509#													
ILF24	4-519#													
ILF26	4-520#													
ILF30	4-524#													
ILF32	4-524#													
ILF34	4-524#													
ILF36	4-524#													
ILF40	4-524#													
ILF42	4-524#													
ILF44	4-524#													
ILF46	4-524#													
ILF54	4-527#													
ILF56	4-528#													
ILF64	4-531#													
ILF66	4-532#													
ILF74	4-535#													
ILF76	4-536#													
ILR	4-587#	31-51	31-97	31-101	32-232	32-236	32-239	34-128	34-131	34-134				
ILRG50	4-718#													
ILRG52	4-718#													
ILRG54	4-718#													
ILRG56	4-718#													
ILRG60	4-718#													

CROSS REFERENCE TABLE (CREF V04.00)

ILRG62 4-718#
ILRG64 4-718#
ILRG66 4-718#
ILRG70 4-718#
ILRG72 4-718#
ILRG74 4-718#
ILRG76 4-718#
IOTVEC 4-492# 10-23* 10-23*
IPCK0 4-769#
IPCK1 4-769#
IPCK2 4-768#
IPCK3 4-767#
IR 4-746# 30-56
IVC 4-685# 13-A17 13-A21 13-A48 13-A52 25-194 25-195 28-90 28-213 32-92 32-99 32-102 32-171 34-111
34-115 34-550 35-58 50-58 50-59 50-60 50-62 50-63 50-64 50-67 50-68 50-69 50-70 50-71
50-72 50-73 50-74 50-75 50-76 50-77 50-78 50-79 50-80 50-81 50-82 50-83 50-84 50-85
50-86 50-87 50-88
LBC 4-687# 34-236 34-254 34-259
LBT 4-564# 25-354 25-653 25-655
LF 4-492# 40-1 40-1 43-80 49-18 57-79
LODEV 10-117 49-28#
LS 4-641# 30-80 33-70
LSC 4-686# 34-236 34-270 34-273
LST 4-642# 30-80 33-70
LSTRK 7-0# 12-57* 13-951 13-:20 13-<87 13-<95 13-=42 13-=51 13-=96 13->60 13-E98 16-273 16-384 16-410
17-54 25-590 28-54 34-178
MCLK 4-615#
MCPE 4-728# 24-90 24-107 24-120 24-123 34-27 34-30
MDF 4-620#
MDPE 4-744# 25-481 34-442 34-445
MEDENB 7-0# 12-48* 16-39 16-291*
MFGFIL 16-246 16-275 16-330 16-475* 61-7#
MI 4-623#
MIXED 52-4#
MOC 4-618#
MOH 4-649#
MOL 4-562# 10-98 28-151 28-161 28-162 28-167 28-172 28-200 31-37 31-40 32-68 32-145 32-146 32-153
32-158 33-30 34-88 34-256 34-509 34-510 34-532 34-537 35-35 35-36 35-40 35-45
MRD 4-616#
MS 4-621#
MSC 4-624#
MSDRVS 11-64 49-23#
MSE 4-694# 13-C52 17-29
MSER 4-619#
MSGDRV 12-61 49-24#
MSHELP 11-11 49-8#
MUR 4-617#
MWD 4-640# 30-81 33-71
MWP 4-622#
MXF 4-743# 25-339 34-50 34-63 34-66
N 11-19 49-35#
NDTMSK 4-590#
NED 4-740# 10-87 24-72 24-76 27-31
NEM 4-741# 25-324
NONE 12-7 49-34#
NOP 4-508#

NOTAVL 10-105 49-30#
NOTPRS 10-102 49-29#
NOTRM 10-96 49-27#
NSA 4-647#
OCC 4-628#
OFD 4-661# 13-@55 13-@57
OFFSET 4-514# 13-?78 13-@15
OM 4-569# 32-145 32-201 32-204 33-29 34-457 34-460
ONES 13-474 13-570 13-663 52-21#
OPE 4-684#
OPI 4-575# 25-178 28-145 28-169 31-51 31-69 31-73 32-24 32-61 32-64 32-155 34-83 34-86 34-534
35-42 50-57 50-58 50-59 50-60 50-61 50-62 50-63 50-64 50-65 50-66 50-67 50-68 50-69
50-70 50-71 50-72 50-73 50-74 50-75 50-76 50-77 50-78 50-79 50-80 50-81 50-82 50-83
50-84 50-85 50-86 50-87 50-88
OR 4-745#
PACACK 4-518# 16-118
PAKACK 4-517# 4-518 15-125
PAR 4-585# 24-135 24-139 24-151 28-30 32-24 32-29 32-34 34-41 34-46
PAT 4-748#
PDA 4-635#
PFECH 43-59 43-164#
PFECH1 43-164 43-165#
PFECH2 43-164 43-168#
PFECH3 43-164 43-171#
PFECH4 43-164 43-173#
PGE 4-742#
PGM 4-565# 33-29
PHA 4-636#
PIP 4-561# 15-180 16-149 28-161 28-182 28-187 32-145 32-216 32-221 33-29 34-509 34-515 34-520 35-35
35-72 35-77
PIRQ 4-492#
PIRQVE 4-492#
PLFS 4-633#
PR0 4-492#
PR1 4-492#
PR2 4-492#
PR3 4-492# 41-5
PR4 4-492#
PR5 4-492# 12-50 41-9
PR6 4-492# 10-26 13-7 20-40 21-34 22-5 23-11 27-22 29-14
PR7 4-492#
PRIERR 13-109 13-130 13-211 13-233 13-308 13-328 13-401 13-424 13-526 13-547 13-622 13-642 13-715 13-738
13-840 13-860 13-935 13-:12 13-:93 13-;13 13-;70 13-:91 13-<53 13-<74 13-=34 13-=88 13->37 13->93
13-?42 13-@08 13-@45 13-A15 13-A46 13-B15 13-B51 13-C27 13-C48 13-D81 13-E02 13-E86 24-39#
PS 4-492 4-492#
PSEL 4-729#
PSW 4-492#
PUT 13-64 13-75 13-99 13-120 13-176 13-201 13-223 13-274 13-298 13-318 13-367 13-391 13-414 13-492
13-516 13-537 13-588 13-612 13-632 13-681 13-705 13-728 13-806 13-830 13-850 13-896 13-920 13-973
13-997 13-:58 13-:83 13-;03 13-;59 13-;81 13-<42 13-<64 13-=18 13-=72 13->26 13->82 13-?31 13-?86
13-?97 13-@23 13-@35 13-@88 13-A04 13-A35 13-A93 13-B04 13-B30 13-B41 13-C16 13-C38 13-D70 13-D92
13-E75 15-128 15-186 16-87 16-119 16-153 16-182 21-28#
PUTBUF 7-0# 16-48 16-292* 21-31
PUTINX 7-0# 13-57 13-93 13-169 13-195 13-267 13-292 13-360 13-385 13-485 13-510 13-581 13-606 13-674
13-699 13-799 13-824 13-889 13-914 13-966 13-991 13-:51 13-:77 13-;50 13-<33 13-=07 13-=63 13->17
13->73 13-?22 13-?79 13-?91 13-@16 13-@29 13-@85* 13-@86* 13-@94 13-A84 13-C07 13-D61 13-E66 15-126*

CROSS REFERENCE TABLE (CREF V04.00)

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        15-127*  15-184*  15-185*  16-62    21-32    24-142
PWRVEC   4-492#  10-23*   10-23*   47-1*    47-1*    47-1*    47-1*    47-1*    47-1*
QUES    49-6#
R6       4-492#  10-23    10-23*   10-23*
R7       4-492#
RCLSTS  15-209   16-170   32-15#
RD       4-533#
RDCHR   11-12    11-65    11-82    44-1     46-1#
RDLIN   45-1     46-1#
RDOCT   11-35    11-49    46-1#
RDY      4-732#  23-17    23-18    24-86    24-89    30-31
READY   12-37#   14-24
RECAL    4-511#  15-183   16-152
RESREG  43-148   46-1#
RESVEC   4-492#
REX      4-631#
RG       4-629#
RGDTPT  52-3#
RH       4-534#  13-117   13-220   13-534   13-913   13-990   13-;78   13-<61   13-=02   13-=58   13->09   13->65   13-?14   13-@27
        13-A32   13-B28   13-B39   13-C35   13-D89   16-181
RIP      4-516#
RLEASE   4-513#
RMAS     4-704#
RMASI    7-0#    33-50    59-13
RMASO    7-0#
RMBA     4-776#  13-12*   13-13    13-95    13-197   13-294   13-387   13-512   13-608   13-701   13-826   13-916   13-993   13-:79
        13-;55   13-<38   13-=11   13-=68   13->22   13->78   13-?27   13-?93   13-@31   13-A00   13-A89   13-C12   13-D66   13-E71
        16-67
RMBAE    4-779#
RMBAEI   7-0#
RMBAEO   7-0#
RMBAI    7-0#    13-442   13-754   25-560   25-562   30-42    59-14
RMBAO    7-0#    13-41*   13-118*  13-153*  13-221*  13-251*  13-344*  13-469*  13-535*  13-565*  13-658*  13-783*  13-880*  13-957*
        13-:33*  13-;34*  13-;79*  13-<17*  13-<62*  13-=01*  13-=57*  13->08*  13->64*  13-?13*  13-?63*  13-@28*  13-@58*  13-@69*
        13-A33*  13-A68*  13-B27*  13-B83*  13-C36*  13-D37*  13-D90*  13-E44*  16-60*   16-246   16-275*  16-279   16-282*  17-21
        16-31    25-554   25-558
RMCS1    4-700#   4-774#  10-89    13-9*    13-61    13-96    13-173   13-198   13-271   13-295   13-364   13-388   13-489   13-513
        13-585   13-609   13-678   13-702   13-803   13-827   13-893   13-917   13-970   13-994   13-:55   13-:80   13-;56   13-<39
        13-=13   13-=69   13->23   13->79   13-?28   13-?83   13-?94   13-@20   13-@32   13-A01   13-A90   13-C13   13-D67   13-E72
        15-126   15-184   16-68    20-42    21-36    23-16    27-28
RMCS1I   7-0#    16-208   24-65    24-67    24-69    24-86    24-88    24-91    24-102   24-106   24-108   24-120   24-122   24-124
        25-47    25-49    25-60    25-103   25-540   30-29    33-16    34-27    34-29    34-31    59-13
RMCS10   7-0#    13-42*   13-56*   13-73*   13-92*   13-117*  13-154*  13-168*  13-194*  13-220*  13-252*  13-266*  13-291*  13-316*
        13-345*  13-359*  13-384*  13-412*  13-470*  13-484*  13-509*  13-534*  13-566*  13-580*  13-605*  13-630*  13-659*  13-673*
        13-698*  13-726*  13-784*  13-798*  13-823*  13-848*  13-888*  13-913*  13-965*  13-990*  13-:34*  13-:50*  13-:76*  13-;01*
        13-;35*  13-;49*  13-;78*  13-<18*  13-<32*  13-<61*  13-=02*  13-=58*  13->09*  13->65*  13-?14*  13-?64*  13-?78*  13-?90*
        13-@15*  13-@27*  13-@70*  13-@92*  13-A32*  13-A69*  13-A83*  13-B02*  13-B28*  13-B39*  13-B84*  13-C06*  13-C35*  13-D38*
        13-D60*  13-D89*  13-E45*  13-E65*  15-125*  15-183*  16-86*   16-118*  16-152*  16-181*  16-312   17-26    25-27    25-576
        34-324   34-344
RMCS2    4-777#  10-84*   10-85*   10-87    12-55*   12-56*   13-14    13-15*   13-16    13-17*   20-41    21-35    27-27*   27-29
        29-16*   29-18*
RMCS2I   7-0#    13-428   13-433   13-435   13-742   13-746   13-748   24-47    24-72    24-74    24-75    25-95    25-166   25-267
        25-310   25-325   25-340   25-482   25-556   30-51    34-50    34-63    34-65    34-67    34-442   34-444   34-446   34-496
        34-498   34-500   59-13
RMCS20   7-0#
RMCS3    4-780#
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CROSS REFERENCE TABLE (CREF V04.00)

RMCS3I 7-0#
RMCS3O 7-0#
RMDA 4-701# 13-58 13-170 13-268 13-361 13-486 13-582 13-675 13-800 13-890 13-967 13-:52 13-;51 13-<34
13-=08 13-=64 13->18 13->74 13-?23 13-?80 13-@17 13-@96 13-A85 13-C08 13-D62 13-E67 16-63
RMDAI 7-0# 25-628 25-699 59-14 59-16
RMDAO 7-0# 13-39* 13-150* 13-248* 13-341* 13-466* 13-562* 13-655* 13-781* 13-875* 13-943* 13-951* 13-952* 13-:20*
13-:21* 13-:30* 13-;30* 13-;39 13-<03* 13-<04 13-<13* 13-<22 13-<86* 13-<87 13-<95* 13-<96* 13-=42* 13-=43*
13-=51* 13-=52* 13-=96* 13-=97* 13->05* 13->45* 13->46 13->51* 13->60* 13->61* 13-?01* 13-?02 13-?10* 13-?60*
13-?68 13-@66* 13-@74 13-A64* 13-B81* 13-D34* 13-E40* 13-E92* 13-E93 13-E96* 13-E97* 13-E98 13-F01* 16-57*
16-233* 16-238* 16-241* 16-242 16-248 16-250 16-273* 16-281* 16-307 16-425* 17-24 25-588 25-589 25-628
28-54 28-57 28-61 28-65 34-178 34-181 34-185 34-189
RMDB 4-778# 13-18* 13-19 13-446 13-758 19-20
RMDBI 7-0# 13-450 13-762
RMDBO 7-0#
RMDC 4-710# 13-59 13-171 13-269 13-362 13-487 13-583 13-676 13-801 13-891 13-968 13-:53 13-;52 13-<35
13-=09 13-=65 13->19 13->75 13-?24 13-?81 13-@18 13-@97 13-A86 13-C09 13-D63 13-E68 16-64
RMDCI 7-0# 25-712 59-14 59-16
RMDCO 7-0# 13-38* 13-149* 13-247* 13-340* 13-465* 13-561* 13-654* 13-780* 13-878* 13-955* 13-:29* 13-:48 13-:49*
13-:75* 13-;29* 13-<12* 13-<99* 13-=55* 13->04* 13->59* 13-?09* 13-?50* 13-?51 13-?59* 13-@65* 13-A63* 13-B80*
13-D33* 13-E39* 13-E49 13-F02* 13-F03 16-56* 16-239 16-268 16-272* 16-306 16-416* 16-424* 17-23 25-587
28-50 34-174
RMDS 4-702# 10-86 10-98
RMDSI 7-0# 15-122 15-180 16-115 16-149 24-104 25-34 25-36 25-81 25-98 25-132 25-136 25-192 25-219
25-354 25-654 28-96 28-151 28-160 28-167 28-171 28-173 28-182 28-186 28-188 28-197 28-199 28-201
28-211 28-215 28-217 30-124 31-23 31-25 31-27 31-37 31-39 31-41 32-68 32-106 32-144 32-153
32-157 32-159 32-169 32-173 32-174 32-185 32-187 32-189 32-201 32-203 32-205 32-216 32-220 32-222
33-28 34-88 34-90 34-119 34-256 34-322 34-457 34-459 34-461 34-508 34 515 34-519 34-521 34-532
34-536 34-538 34-548 34-552 34-554 35-34 35-40 35-44 35-46 35-56 35-60 35-61* 35-62 35-72
35-76 35-78 59-13
RMDSO 7-0#
RMDT 4-707# 10-92 10-94 43-26
RMDTI 7-0# 59-5 59-17
RMDTO 7-0#
RMEC1 4-714#
RMEC1I 7-0# 18-32 59-14
RMEC1O 7-0#
RMEC2 4-715# 19-15
RMEC2I 7-0# 18-53 19-14 30-92 33-94 59-15
RMEC2O 7-0#
RMER1 4-703# 24-143
RMER1I 7-0# 13-B55 13-B60 13-B61 13-C58 13-C63 13-C64 13-C97 13-D02 13-D03 13-E06 13-E11 13-E12 16-221
18-23 18-25 24-135 24-150 24-152 25-76 25-152 25-179 25-222 25-237 25-280 25-357 25-383 25-398
25-413 25-497 25-516 25-519 25-651 25-667 25-682 25-694 26-24 28-30 28-37 28-71 28-145 28-148
28-169 30-69 31-51 31-55 31-57 31-58 31-69 31-71 31-72 31-83 31-85 31-86 31-97 31-99
31-100 31-111 31-113 31-114 32-24 32-29 32-33 32-35 32-45 32-47 32-49 32-61 32-63 32-65
32-78 32-80 32-82 32-155 32-232 32-236 32-238 32-240 32-250 32-252 32-254 32-264 32-268 32-270
33-41 34-41 34-45 34-47 34-83 34-85 34-87 34-128 34-131 34-133 34-135 34-145 34-147 34-149
34-159 34-161 34-163 34-193 34-283 34-286 34-290 34-292 34-301 34-303 34-305 34-315 34-317 34-318
34-352 34-356 34-358 34-360 34-369 34-371 34-373 34-382 34-384 34-386 34-395 34-397 34-399 34-417
34-419 34-421 34-427 34-483 34-485 34-487 34-534 35-42 59-13
RMER1O 7-0# 24-139
RMER2 4-713#
RMER2I 7-0# 13-931 13-:08 13-=30 13-=84 13-A17 13-A19 13-A20 13-A48 13-A50 13-A51 13-C71 13-C76 13-C77
13-C84 13-C89 13-C90 15-55 16-83 16-224 16-231 24-137 25-78 25-196 25-252 25-428 25-459 26-27
28-32 28-90 28-93 28-104 28-132 28-135 28-184 28-213 30-114 32-31 32-92 32-99 32-101 32-103
32-116 32-118 32-120 32-130 32-132 32-134 32-171 32-218 32-266 33-103 34-43 34-111 34-114 34-116

CROSS REFERENCE TABLE (CREF V04.00)

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        34-207  34-211  34-236  34-240  34-242  34-244  34-254  34-258  34-260  34-270  34-272  34-274  34-288  34-470
        34-472  34-474  34-517  34-550  35-58   35-74   35-88   35-94   35-96   35-98   35-108  35-110  35-112  59-13
RMER20   7-0#
RMHR     4-711#
RMHRI    7-0#
RMHRO    7-0#
RMLA     4-705#
RMLAI    7-0#    59-16
RMLAO    7-0#
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RMMR1I   7-0#    30-79   33-69   59-17
RMMR10   7-0#    13-a84* 13-a93*
RMMR2    4-712#
RMMR2I   7-0#    30-101  33-81   59-17
RMMR20   7-0#
RMOF     4-709#  13-60   13-172  13-270  13-363  13-483  13-584  13-677  13-802  13-892  13-969  13-:54  13-;53  13-<36
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RMOFI    7-0#    18-21   18-27   25-373  25-447  25-449  25-514  25-623  34-348  34-424  59-14   59-16
RMOFO    7-0#    13-36*  13-140  13-142* 13-151* 13-249* 13-342* 13-467* 13-563* 13-656* 13-778* 13-866  13-868* 13-876*
        13-941  13-944* 13-953* 13-:18  13-:22* 13-:31* 13-;31* 13-<14* 13-<97* 13-=40  13-=44* 13-=53* 13-=94  13-=98*
        13->06* 13->49  13->52* 13->62* 13-?11* 13-?61* 13-a55  13-a57* 13-a67* 13-A65* 13-B25* 13-B26* 13-B67  13-B79*
        13-D35* 13-E42* 16-59*  16-235* 16-274* 16-283* 16-375  16-401  17-32   17-37   25-599  25-626  28-59   28-63
        34-183  34-187  59-11
RMR      4-586#  31-51   31-83   31-87   32-232  32-250  32-253  34-128  34-159  34-162
RMSN     4-708#
RMSNI    7-0#    59-17
RMSNO    7-0#
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        13-;54  13-<37  13-=12  13-=67  13->21  13->77  13-?26  13-?92  13-a30  13-a99  13-A88  13-C11  13-D65  13-E70
        16-65
RMWCI    7-0#    18-72   25-538  25-551  25-572  25-677  59-14
RMWCO    7-0#    13-40*  13-152* 13-193* 13-219* 13-250* 13-343* 13-468* 13-564* 13-657* 13-782* 13-879* 13-956* 13-:32*
        13-;33* 13-<16* 13-=00* 13-=56* 13->07* 13->63* 13-?12* 13-?62* 13-a68* 13-A66* 13-B82* 13-D36* 13-E43* 16-58*
        16-276* 16-309  17-22   18-73   25-552  25-573
RQA      4-670#  30-102  33-82
RQB      4-671#  30-102  33-82
RTC      4-515#
SA1      4-551#
SA16     4-547#
SA2      4-550#
SA4      4-549#
SA8      4-548#
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SAVREG  43-13    46-1#
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SC0      4-604#
SC1      4-603#
SC2      4-602#
SC3      4-601#
SC4      4-600#
SCOPE    4-492#  13-2    13-33   13-146  13-244  13-337  13-462  13-558  13-651  13-775  13-872  13-948  13-:26  13-;26
        13-<09  13-<92  13-=48  13->02  13->57  13-?07  13-?56  13-a62  13-A60  13-B73  13-D27  13-E36  14-9
SCTMSG  13-44   13-156  13-254  13-347  13-472  13-568  13-661  13-786  13-:36  13-;37  13-<20  13-?66  13-a72  13-A71
        13-B86  13-D40  13-E47  49-3#
SCTMSK   4-606#
SEARCH   4-521#  25-100  25-533
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CROSS REFERENCE TABLE (CREF V04.00)

SECERR 13-113 13-134 13-215 13-237 13-312 13-332 13-405 13-530 13-551 13-626 13-646 13-719 13-844 13-864
13-939 13-:16 13-:97 13-;17 13-;74 13-;95 13-<57 13-<78 13-=38 13-=92 13->41 13->97 13-?46 13-@12
13-@49 13-A24 13-A55 13-B19 13-B65 13-C31 13-D12 13-D85 13-E21 13-E88 25-24#
SEEK 4-510# 13-56 13-73 13-168 13-266 13-359 13-484 13-580 13-673 13-798 13-888 13-965 13-:50
SEKSTS 13-88 13-189 13-287 13-380 13-505 13-601 13-694 13-819 13-909 13-986 13-:71 28-19#
SHUT 14-16 14-20 14-22# 44-6
SHUT2 44-1 44-1 44-3#
SIZCLK 12-28 22-3#
SKI 4-683# 15-178 16-147 28-49 28-52 28-75 28-105 28-107 28-111 28-122 28-184 30-115 32-92 32-116
32-119 32-218 34-173 34-176 34-197 34-208 34-210 34-211 34-213 34-225 34-517 35-74 35-89 35-108
35-111
SNGPRT 4-652#
SSE 4-689# 13-931 13-:08 13-=30 13-=84 13-C71 13-C78 16-224 16-231 25-458
SSEI 4-660# 13-866 13-868 13-941 13-944 13-:18 13-:22 13-;31 13-=40 13-=44 13-=94 13-=98 13-E42 16-235
16-375 16-401 17-37 25-449 25-599 25-624 25-626 25-637 28-63 34-187
SSF 4-696# 13-C50 13-E57
SSFENB 7-0# 13-E55 16-338* 16-365*
SSFIL 16-336 16-446 16-451 16-454 16-470 61-17#
STACK 4-492# 10-23 13-2 13-33 13-146 13-244 13-337 13-462 13-558 13-651 13-775 13-872 13-948 13-:26
13-;26 13-<09 13-<92 13-=48 13->02 13->57 13-?07 13-?56 13-@62 13-A60 13-B73 13-D27 13-E36
STANDA 10-66 11-3#
START 5-1 10-17# 12-33 12-42 14-27
START1 5-3 10-14# 13-28
START2 10-15 10-18#
STCDRV 35-27#
STIMER 13-67 13-A96 13-B33 23-14 23-38#
STKLMT 4-492#
STOP 41-1 41-5#
STSD1 55-1 55-2 55-8 55-10 55-11 55-12 59-13#
STSD2 55-1 55-2 55-8 55-10 55-11 55-12 59-14#
STSD3 59-16#
STSD4 55-1 55-2 55-8 55-10 55-11 55-12 59-17#
STSF 56-1 56-1 56-1 56-2 56-2 56-2 56-8 56-8 56-8 56-10 56-10 56-10 56-11 56-11
56-11 56-12 56-12 56-12 60-7#
STSH1 54-1 54-2 54-8 54-9 54-11 54-12 54-13 58-21#
STSH2 54-1 54-2 54-8 54-9 54-11 54-12 54-13 58-23#
STSH3 58-25#
STSH4 54-1 54-2 54-8 54-9 54-11 54-12 54-13 58-26#
SW0 4-492#
SW00 4-492 4-492#
SW01 4-492 4-492#
SW02 4-492 4-492#
SW03 4-492 4-492#
SW04 4-492 4-492#
SW05 4-492 4-492#
SW06 4-492 4-492#
SW07 4-492 4-492#
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SW12 4-492#
SW13 4-492# 16-260 43-14
SW14 4-492#
SW15 4-492#

CROSS REFERENCE TABLE (CREF V04.00)

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SW2       4-492#
SW3       4-492#
SW4       4-492#
SW5       4-492#
SW6       4-492#
SW7       4-492#
SW8       4-492#
SW9       4-492#
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         41-1*    41-1*   41-1*   41-1*   42-1    42-1    42-1    42-1    42-1    43-14   44-1    44-1    44-1*   47-1
         47-1*
SWREG     5-1#    10-23   10-28   44-1    44-1    44-1
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TA2       4-543#  13-39   13-150  13-248  13-341  13-466  13-562  13-655  13-781  13-875  13-943  13-:30  13-;30  13->05
         13->51   13-?60  13-@66  13-A64  13-B81  13-D34  13-E40
TA4       4-542#  12-57
TA8       4-541#  12-57
TADMSK    4-554#  25-594
TAG       4-672#
TAGADR    5-9#     6-0
TAP       4-648#
TBITVE    4-492#
TIMOUT   13-80    13-103  13-124  13-181  13-205  13-227  13-279  13-302  13-322  13-372  13-395  13-418  13-497  13-520
         13-541   13-593  13-616  13-636  13-686  13-709  13-732  13-811  13-834  13-854  13-901  13-924  13-978  13-:01
         13-:63   13-:87  13-;07  13-;64  13-;85  13-<47  13-<68  13-=23  13-=77  13->31  13->87  13-?36  13-@02  13-@39
         13-A09   13-A40  13-B09  13-B45  13-C21  13-C42  13-D75  13-D96  13-E80  15-136  15-194  16-95   16-127  16-161
         16-190   23-9#
TKVEC     4-492#  44-1*   44-1*
TPVEC     4-492#
TRAPVE    4-492#  10-23*  10-23*
TRE       4-727#  16-208  24-90   24-107  24-123  25-102  25-104  25-540
TRTVEC    4-492#
TST       4-673#  30-103  33-83
TST1     13-2#    41-1
TST10    13-651#  41-1
TST11    13-775#  41-1
TST12    13-872#  41-1
TST13    13-948#  41-1
TST14    13-:26#  41-1
TST15    13-:26#  41-1
TST16    13-<09#  41-1
TST17    13-<92#  41-1
TST2     13-33#   41-1
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TST21    13->02#  41-1
TST22    13->57#  41-1
TST23    13-?07#  41-1
TST24    13-?56#  41-1
TST25    13-@62#  41-1
TST26    13-A60#  41-1
TST27    13-B73#  41-1
TST3     13-146#  41-1
TST30    13-D27#  41-1
TST31    13-E36#  41-1
TST4     13-244#  41-1
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CROSS REFERENCE TABLE (CREF V04.00)

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TST5      13-337#  41-1
TST6      13-462#  41-1
TST7      13-558#  41-1
TSTNMB    43-36*   43-37*   43-39    43-151#
TSTPRP    13-52    13-164   13-262   13-355   13-480   13-576   13-669   13-794   13-884   13-961   13-:44   13-;45   13-<28   13-=05
          13-=61   13->13   13->69   13-?18   13-?74   13-@80   13-A28   13-A79   13-B94   13-D48   13-E61   15-38#
TSTQUE     7-0#    12-8     12-9*    12-51    13-2     13-33    13-146   13-244   13-337   13-462   13-558   13-651   13-775   13-872
          13-948   13-:26   13-:26   13-<09   13-<92   13-=48   13->02   13->57   13-?07   13-?56   13-@62   13-A60   13-B73   13-D27
          13-E36   14-11    14-13*   14-17    14-17*   27-24    29-17    30-54    33-53
TYPBN     43-141   46-1#
TYPDS     14-20    14-20    43-135   46-1#
TYPE      10-6     10-28    10-42    10-48    10-53    10-59    10-76    10-80    10-82    10-96    10-102   10-105   10-109   10-117
          10-120   10-121   10-122   10-129   11-11    11-16    11-17    11-19    11-20    11-28    11-32    11-34    11-40    11-44
          11-48    11-54    11-61    11-62    11-64    11-69    11-75    11-86    11-87    11-92    11-100   12-3     12-6     12-7
          12-14    12-25    12-30    12-60    12-61    13-44    13-156   13-254   13-347   13-472   13-568   13-661   13-786   13-:36
          13-;37   13-<20   13-?66   13-@72   13-A71   13-B86   13-D40   13-E47   14-20    14-20    14-20    37-1     38-1     39-1
          40-1     42-1     42-1     43-20    43-21    43-31    43-32    43-38    43-43    43-45    43-53    43-96    43-102   43-106
          43-118   43-124   43-126   43-144   43-146   44-1     44-1     44-1     44-1     44-1     44-1     44-1     44-1     44-1
          44-1     44-1     44-1     44-1     44-1     44-1     44-1     44-1     44-1     46-1#    47-1
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TYPON     46-1#
TYPOS     10-45    10-56    10-81    12-16    12-62    43-22    43-39    43-44    43-46    46-1#
U0         4-752#
U1         4-752#
U2         4-752#
UNS        4-574#  30-70    31-51    31-55    31-59    32-232   32-264   32-269   34-283   34-286   34-291
UNTMSK     4-756#  24-48    24-50
UNTOFF    10-109   49-31#
UNTON     10-120   49-32#
UPE        4-739#  25-266
USE        4-695#  13-C52   17-29
USRFIL    16-279   16-282   16-333   61-12#
VV         4-568#  15-122   16-115   25-192   28-96    28-161   28-162   28-211   28-216   31-23    31-26    32-106   32-145   32-146
          32-169   32-175   33-29    34-90    34-119   34-509   34-510   34-548   34-553   35-35    35-36    35-56    35-61
WC         4-638#  30-80    33-70
WCD        4-525#
WCE        4-738#  13-428   13-434   13-742   13-747   25-165   50-77    50-78
WCEHI      4-763#
WCELO      4-764#
WCF        4-583#   4-590   25-236   34-483   34-486
WCH        4-526#  13-316   13-412   13-630   13-726   13-848   13-;01
WD         4-529#
WH         4-530#  13-42    13-92    13-154   13-194   13-252   13-291   13-345   13-384   13-470   13-509   13-566   13-605   13-659
          13-698   13-784   13-823   13-:34   13-:76   13-;35   13-;49   13-<18   13-<32   13-?64   13-?90   13-@70   13-@92   13-A69
          13-A83   13-B02   13-B84   13-C06   13-D38   13-D60   13-E45   13-E65   34-346
WLE        4-577#   4-590   25-217   25-221   25-234   25-249   25-264   34-283   34-315   34-319   34-327   50-81    50-82
WRL        4-563#  25-219   34-322
XSIZ      10-70#   11-71    11-101
XXDP       7-0#    10-33*   10-36*   10-37    10-39*   10-44    10-55    10-113   10-115
Y         49-36#
ZEROS     13-46    13-158   13-256   13-349   13-788   13-:38   13-A73   13-B88   13-D42   52-38#
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CROSS REFERENCE TABLE (CREF V04.00)

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COMMEN   4-492#
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CROSS REFERENCE TABLE (CREF V04.00)

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CROSS REFERENCE TABLE (CREF V04.00)

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	8-426	8-429	8-432	8-435	8-438	8-441	8-444	8-447	8-450	8-453	8-456	8-459	8-462	8-465
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